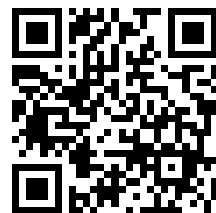


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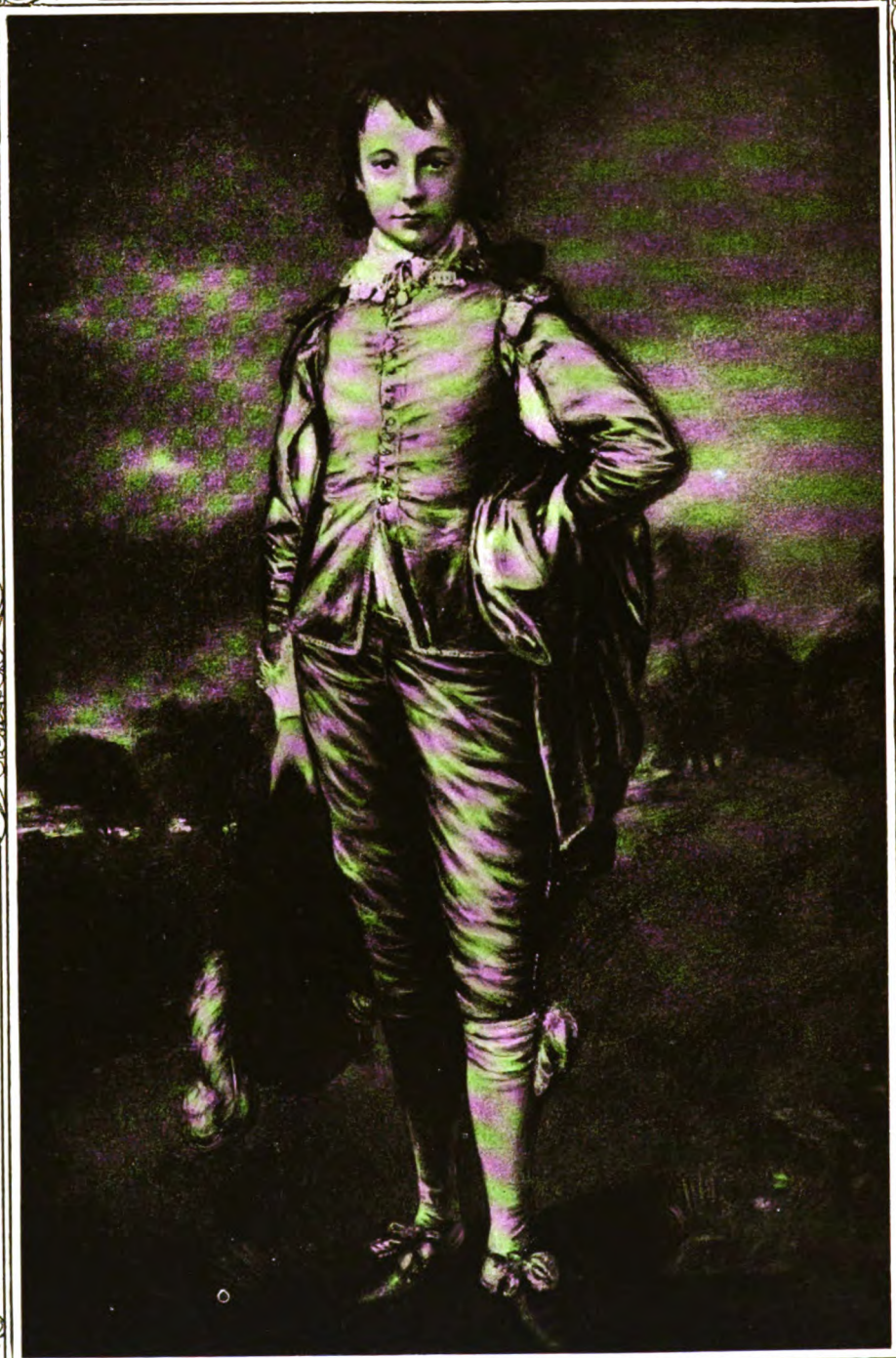












THE BLUE BOY, A FAMOUS PORTRAIT OF A HUNDRED YEARS AGO  
This fine portrait was painted by Thomas Gainsborough, R.A., to show how blue could be used as the chief colour in a picture.

# The Book of Knowledge

## The Children's Encyclopædia

EDITORS-IN-CHIEF

ARTHUR MEE  
Temple Chambers, London

HOLLAND THOMPSON, Ph. D.  
The College of The City of New York

With an Introduction by

JOHN H. FINLEY, LL. D.  
President of The College of The City of New York

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This is a short guide only to the principal contents of this volume. It is not possible to give the titles of all the Poems and Rhymes, Legends, Problems, colour pages, questions in the Wonder Book, and many other things that come into the volume; but in all cases are given the pages where these parts of our book begin. The full list of these things comes into the big index to the whole work.

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## WHAT THIS STORY TELLS US

**M**OST girls love furs and long to own them, but they seldom think of the little animals that must give up their lives in order that they may wear their skins. Much of Canada's wealth has come from the fur trade, and now you are to learn something of the animals that have helped to make the country rich. You will find that they are caught in many ways, some of which seem very cruel to us. Because of this fact some women refuse to wear furs.

## FURS FROM THE WILDS OF CANADA

**T**HE little makers of the great Dominion is a name that may be given to a few little fur-bearing animals. Few of us realise the part they have played in the making of Canada. Gold and fur have been the two great colonising factors in America, but in Canada the quest for furs has been more important than the seeking for gold. The little beaver led discoverers from the St. Lawrence to the Mississippi and from the Mississippi to the Rockies. Today, from the point of value, the beaver has given place to the muskrat, and between two and three millions of their skins are yearly sent to other lands. These, along with the fox, the marten, the mink and the ermine, complete the list of Canada's staple furs. Canada exports more furs than ever before in her history. It seems that the great fur lands of the North will continue for centuries to provide the world with the larger part of the choicest furs.

### SEASONS FOR FURS

Furs are best in winter because nature has supplied all animals with warm thick coats to protect them during the cold weather. During the warm season furs are worthless, because as summer approaches the fur-bearing animals shed their coats or at least lose the finest and thickest parts. After November and until the approach of the warm season furs are said to be in their prime. As we go farther north and the weather becomes more severe, the animals need more

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protection from the cold and so we find their coats much thicker and consequently more valuable.

### METHODS OF CAPTURE—POISONING

Strychnine is sometimes used to poison animals. A small amount of this poison is put in a small piece of meat and placed where the animals will find it. After eating this, they rarely go more than three or four rods before they will drop dead. The poison fevers the animals, spoils the pelts and takes away the glossy life from the furs. Fur traders will not buy the pelts of poisoned animals.

### SHOOTING

This method of killing fur-bearing animals is very wasteful. The holes that are made in the skin are but a small part of the damage that is done. The shot that enters the body directly are almost harmless compared with those that strike it obliquely or graze across it. Each of these grazing shot cuts a furrow in the fur sometimes several inches in length, shaving every hair in its course as with a razor.

### THE DEADFALL

This is a clumsy contrivance for killing animals which can be made anywhere with an axe and hard work. A hunter cuts down a number of saplings and shapes them into stakes of about a yard in length. These are driven into the ground so as to form a small circular palisade or fence in the shape of half an oval. Across the

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entrance to this little enclosure, which is of a length to admit about two-thirds of the animal's body and too narrow to permit it to enter fairly and turn around, a thick limb is laid. A larger log or tree is placed upon the log at the entrance in a parallel direction. Inside the circle a small forked stick holds a bit of dried meat or squirrel as bait.

This is projected horizontally into the enclosure and on the outer end of it rests another short stick placed perpendicularly which supports the large log enough above the lower to admit the entrance of the animal. The top of the trap is then covered over with bark and branches so that the only means of access to the bait is by the opening between the propped up tree and the log beneath. The marten or fisher creeps under the tree and seizes the bait. Finding himself unable to pull it off, he backs out, still tugging at the forked stick to which the bait is attached. Just as the centre of his back comes under the tree, he loosens the baited stick, which lets slip the small supporting one, which in turn lets fall the large log.

#### STEEL TRAPS

The experience of trappers has led them to conclude that the old steel trap is the surest and most economical means of capturing fur-bearing animals. Steel traps can be easily transported; can be combined by means of chain and ring with a variety of contrivances for securing the animal caught from destruction by other animals and from escape by self-amputation; and above all, they do not injure the fur. They are very extensively used in all parts of Canada.

#### THE MUSKRAT

These little animals are found all over Canada and are well-known to every school-boy. Muskrats are nocturnal in their habits but are frequently seen swimming and feeding in the daytime. Their natural food is grass and roots but they will eat clams, grain, apples and vegetables. They thrive best in sluggish streams or in ponds bordered

with grass and flags. There you will see their dome-shaped houses, rising sometimes two or three feet above the water.

These little animals travel a long distance under water. In winter, they frequently take long trips under the ice. They fill their lungs on starting and remain under water as long as they can. Then they rise to the ice and breathe out the air from their lungs, which remains in bubbles on the lower surface of the ice. They wait till this air recovers oxygen from the water and the ice and then they breathe it and go on till the operation has to be repeated. In this way they can travel almost any distance and live any length of time under ice. Mink, otter and beaver travel under ice in the same way.

In summer muskrats generally live in banks and in hollow trees that stand near a stream. They breed three times a year and bring forth six to nine at a time.

Between the wheat plains of the northwest and the Hudson Bay there is a great swamp with an area of twenty-eight thousand square miles. This whole space is covered with goose grass and reeds with lanes of water crossing in endless maze. This is the great country for mink and muskrats. Of the latter over a million skins a year are sent from this region. The supply does not show any signs of decreasing.

#### THE BEAVER

The beaver belongs to the same family with the muskrat. Indeed, these two species are so nearly alike that a beaver seems to be only a muskrat enormously enlarged. The body is thick, heavy and squat, about two feet and a half long, weighing when full-grown from fifty to sixty pounds. The tail is the most notable part of the animal. It measures from ten to twelve inches in length and from three to four and a half inches in breadth. It is oval in shape but flattened on the upper and under sides and is covered with a species of hairy scales. The tail serves as both rudder and oar in swimming.

Their huts are much like those of the

## HOW RAW FURS ARE HANDLED



After the furs are purchased from the trappers and traders they must be separated according to kind and quality. Here is a great warehouse where thousands of skins are lying, ready to be sent to the factories where they will be treated. Some will be dyed, and others will be trimmed and prepared for the cutters.



The furs seen above are now packed into bales ready to be sent across the ocean, for there are many secrets of treatment which are not known in this country or in Canada. Then too the furs of North America are much prized in Europe. Some of these bales may be worth several thousand dollars each.

Pictures by courtesy of Revillon Freres, New York



muskrat, but larger and stronger. Those that live on small streams where there is not water enough to surround their huts and protect their stores from freezing in winter build dams to raise the water and create ponds suitable for their purpose. The dams are frequently six or eight feet high and from ten to thirty rods in length.

Before winter sets in, the beavers lay in their winter stores, which consist of the bark of the willow, poplar, birch and alder. They fell these trees with their teeth, cut them up into short sections and sink them in the water near their huts. In the winter, when the ponds are frozen over, they enter the water by the holes at the bottom of their huts, collect these sunken blocks and take them to their dwellings as they require them for food.

The breeding season of the beaver commences in April or May, and they have from two to four young ones at a birth. The young remain with their parents for three years. In the fourth year, they mate and start new colonies. This is the reason why so many dams are built one above another on the same stream.

In many parts of Canada the beaver is nearly extinct. In the far north there are places where they are still numerous and many thousand pelts come yearly from this northern country.

#### THE MINK

This valuable fur-bearing animal is found throughout Canada. They are members of the weasel family and resemble the ferret. Mink usually live on the banks of streams and get much of their food from them. They are of a dark brown colour, have short legs, long bodies and bushy tails. The mothers hide their young until they are half-grown, as the males destroy them.

#### THE MARTEN

This animal is also a member of the weasel family and is about as large as the mink. It differs but little from it save that its feet are larger and hairy to the toes. The fur is usually of a yellowish brown but differs in colour according to season, latitude and locality.

The Hudson Bay marten is very dark-coloured and commands a very high price. Their haunts are the thick dark woods in cold snowy regions and they generally live in hollow trees.

The marten feeds on rabbits, birds, squirrels, mice and other small animals. It is taken in steel traps or by deadfalls. In winter the traps are set in hollow logs or trees baited with bird or squirrel and covered with feathers. In the North, the marten is still plentiful and several thousand are caught every year.

#### THE FOX

Foxes are distributed throughout Canada but are very plentiful in the North. The different species closely resemble each other in size, form, habits and mode of capture and differ only in their colour and the quality of their furs. The red fox is the most common and is found in every part of Canada. Foxes feed upon birds, squirrels, muskrats, mice, eggs, and are very fond of grapes.

The black fox is very rare. It is chiefly found in the North but occasionally a stray one is captured in the thickly settled districts. A fine silky glossy pelt often brings two thousand dollars.

In the far north, is found the beautiful silver fox, with a pelt which is worth its weight in gold. Scientists differ as to the origin of this variety. It is only found in the far north and only a few hundred are caught yearly. The fur is as glossy as silk and has silvered hairs intermingled with black. The more uniform the silver, the more valuable the pelt. A single skin will often sell for three thousand dollars.

In the Arctic regions we have the white fox. The fur is white in winter and of a bluish tinge in summer. Several thousand are caught yearly but the fur is not very valuable.

Fishers and otters are not very plentiful. The little ermine is still found in the far north. Raccoons, skunks, bears, wolves and badgers are taken in large numbers. The annual exportation of raw furs amounts to three million dollars a year. As time goes on, in place of decreasing, the amount is on the increase.



The Giant's Causeway in Ireland, showing the curious pillar-like formation of the basalt rock.

## IS A STONE ALIVE ?

THE answer to this tremendous question depends on what we mean by alive. Animals and plants do certain things which no stones or rocks do. Stones take curious and regular forms, as in crystals and in the columns of the Giant's Causeway in Ireland, shown in the picture on this page. Crystals grow, and sometimes it looks as if little crystals grew from them ; but they do not breathe, and they have not certain other powers which even the simplest and humblest of living things possess. So we must say that, in the strictest sense of the word, stones are not alive.

But that is very far indeed from being the whole answer to the question. It is a proved fact that the substance of which stones are made can help to build up the bodies of living creatures, and these bodies can be broken down into simpler chemicals and made into stones. This seems very curious, but it is true.

Silicon is the name of the commonest element in rocks and stones and sand and clay, and we find that it helps to form the living body, as in the case of wheat, the straw of which always contains some amount of silicon. What is true of stones and silicon is true of many other kinds of "dead matter,"

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as it used foolishly to be called by people who thought they exalted themselves by decrying matter, which is yet the "mother of life." All living things are made of "dead matter," so called, and of nothing

else ; and their life absolutely depends upon the intake of "dead matter" —air and food— from moment to moment. We can only conclude, not less certainly the more we study rocks and stones and trees, that there is one great Power, that can express itself in the making and the history of atoms, in rock and plant and animal and man—the Power "whose dwelling is in the light of setting suns and the round ocean and the living air and in the mind of man."

**DID THE EARTH GO ROUND FASTER BEFORE IT COOLED DOWN?**

This is not a question which anyone can answer very positively, for, of course, none of us were there to see how the earth behaved before it cooled down. Yet there are very powerful arguments which suggest that the pace at which the earth spins must now be getting gradually but certainly slower, and that, of course, means that long ago it went round much faster than it does now. What we call a day is, of course, the time in which the

earth makes one complete turn. It is probable now that the earth lags a few seconds behind the clock, so to speak, in each century, and careful reckonings which have been made—though, of course, there must always be a great deal of doubt about the matter—have led Sir George Darwin to the opinion that at one time the day—that is to say, the period of the earth's rotation, or the time it took to turn once—must have been about four hours long, instead of twenty-four hours, as it is now, and in the far distant future it will be thirty hours or more.

The cause of this slowing of the earth's spinning is mainly to be found in the tides which are raised upon it, chiefly by the moon, but also to some extent by the sun. Even long before the earth cooled down these tides must have existed, though they did not then consist of water so much as of the molten material which afterwards became solid, and formed the rocks that make the crust of the earth. The tides act as a brake, constantly rubbing against the spinning earth, and thus steadily causing it to spin less quickly.

**WHY IS IT THAT IRON DOES NOT BURN AWAY IN THE FIRE?**

When anything burns away in the fire, as we say, what happens is that the substance of it has combined with the oxygen of the air to form compounds called oxides. Sometimes these oxides are in the form of gases and fly away into the air, and so the thing wastes, and sometimes they are in the form of solids which usually crumble away very readily.

What the fire has to do with it is this, that most things will not combine with oxygen until they are fairly warm, and the fire simply raises them to the temperature at which they can begin to burn, just as when we apply a match to a candle.

But it is not true that iron does not waste with fire, though it only does so very slowly at the temperature of an ordinary fire. Iron is capable of being burnt, just as most other things are, only it requires a very high temperature for this burning to go on at all rapidly.

At lower temperatures, however, iron burns, or wastes, slowly. It even does so in the absence of fire altogether, especially if there is a certain amount

of moisture present. This wasting of iron we call rusting, and the rust is made of iron combined with oxygen.

**WHAT MAKES THE FIRELIGHT DANCE?**

If coal were a simple thing, such as pure carbon, and if it were evenly supplied with a steady draught of air, then the firelight would not dance, but would be quite steady. It dances as it does because the processes of burning go on so very irregularly in the fire. For one thing, the supply of air is not quite constant, for the draught up the chimney is considerably affected by the movements of the wind at the top of the chimney. This, of course, must affect the flames of the fire and make them dance.

But that is not all. In coal there is imprisoned a great quantity of gases of various kinds, all of which can be burnt. As the coal breaks up in the fire, these gases escape, here and there, and it is when they burn that they make the beautiful flames of various colours that dance, and so throw a dancing light into the room.

If we burn coal from which the coal-gas has been removed—coke, as we call it—we get a very hot fire, but one without flame or with very little flame, because we are practically burning nothing but the solid carbon itself. In an ordinary fire a certain amount of the gases and a great deal of the carbon itself go up the chimney unburnt, which is, of course, a great waste, to say nothing more. That is part of the price we have to pay for our pretty fires.

**WHY DOES THE LIGHT GIVE LIGHT?**

This sounds at first as if it were rather a foolish question, but it is really a very wise one. We know that what we call light is a wave-motion in the ether, just as we know that what we call sound is a wave-motion of another kind in the air; but there still remains the question for us to ask and answer if we can—Why does the one kind of wave-motion produce in our brain the effect we call light, and the other kind of wave-motion the effect we call sound? Why should not the air waves produce the effect of light and the ether waves produce the effect of sound?

We can only answer this by saying that the brain is so made. We can imagine, as a famous student of the mind—Professor James—has said, that

the nerves from the eye might run to the hearing centre of the brain, and the nerves from the ear to the vision centre; or we might imagine that when we went to a concert we should see the music and hear the movements of the conductor and the players. This is simply another way of saying that what we call light and sound are the consequences of the behaviour of those parts of our brain which correspond to them.

It is extremely interesting that in some people there are what are called *associated sensations*. In these cases, when one part of the brain is excited, as by a sound, another part—the part that sees—is excited also. In such cases we may say that a sound gives a light. Such people, when they hear the sound of a trombone, will at the same time see a crimson colour; or when they hear the sound of another kind of musical instrument they may see a blue colour. These cases seem very extraordinary, but they really do happen.

**WHY DOES CELLULOID CATCH FIRE SO EASILY?**

Paper catches fire easily because it is made from vegetable substances which contain large quantities of carbon and hydrogen, and not very much oxygen. So, when it is made hot by a match or some such means, the carbon and hydrogen of the paper combine with the oxygen of the air, and the paper burns.

Now, celluloid is made from paper or other vegetable fibre by the use of strong acids and camphor, which produce a new compound. When hot it softens, and can then be moulded into various forms, which it retains when cooled. Celluloid has very much the same composition as paper, though it differs in some respects, and it burns for the same reason as paper does.

The material that makes the hard part of plants, and from which paper is made, is called cellulose, and it belongs to the same class of substances as starch and sugar. A certain quantity of celluloid is practically cellulose combined with a proportion of nitric acid.

**WHY DOES A MATCH FLARE UP WHEN TURNED UPSIDE DOWN?**

We can find the key to this question if we remember what happens when a match is burning. It is burning because

the wood and the other materials in the match—or the wax, if it is a wax match—are combining with the oxygen of the air, and it will go on doing this as long as there is sufficient material to burn. In the case of a wooden match held upright, the flame is sometimes apt to go out because it is starved of fuel.

This is less liable to happen in the case of a wax match, because the burnable part of a wax match is largely made of materials which are what we call *volatile*. This means that they turn into gases and rise up when they are heated. But in a wooden match there is not nearly so much of this material, and so it is apt to go out; but if we turn it upside down, then the flame finds an abundance of material on which to feed.

The same is true, as we know, of burning paper, and this is natural enough, because paper and wood are made of the same material, which belongs to the same class of chemical substances as sugar and starch. Unlike the materials that make a wax match, very few of these substances are volatile.

**DOES THE SUN NEVER SHINE IN THE NORTH?**

The sun does sometimes shine in the north. It all depends upon the place from which we are looking at it. It is the northern half of the world that most of us who read this book live in, and it is the northern half of the world that has made the whole of the records of civilisation. Thus the sun has always been known to shine in the south.

Long ages ago, when men voyaged south of the equator and rounded Africa, they reported that on their journey they found the sun shining in the north. This was utterly ridiculed when they came home, even by the greatest writers of the time. But we now recognise that this account of what these travellers saw is very good evidence that they did what they said they had done.

Whatever part of the world we are in, the sun always rises in the east and sets in the west, because the whole earth is, of course, spinning in the same direction, and it is that spin that makes the sun appear to rise and set. But if we are looking at the sun from the northern half of our planet, it appears to travel across the sky in the south; while if we

look at it from the southern part of our planet, it seems to travel across the sky in the north.

We can understand this if we make a picture of the sun in our mind's eye, say, at the level of the floor, and the earth travelling round it at the same level. Then we shall understand how it will appear differently, according to whether we are looking downwards at it from the upper side of a ball, or upwards at it from the lower side of a ball.

**WHAT DO THE FISHES FEED ON?**

We all know that the big fishes feed on the little fishes, but the little fishes must feed on something, and as it is very important that there shall be enough fishes for us to eat, it is very important to know what it is that the smallest fishes feed on.

Now, we know that, on the land, plants are the producers and animals are the consumers; the same is true of the sea, which has its pastures, just as the land has. The sea contains vast quantities of humble plants together with humble kinds of animals, which feed on the plants, and these, between them, furnish the food for the smaller fishes.

The huge masses of tiny vegetables and animals floating in the sea have the special name given to them of *plankton*, and it is this plankton that the smaller fishes and the youngest fishes feed on. It seems to be just at the time of year, in the spring, when the plankton is very abundant, and of a very suitable kind, that the small fry of most of our fishes are produced. Later in the year the plankton changes, and seems just to suit the young fishes when they have grown.

It seems to be clear now, also, that the action of light falling upon the sea has the same effect as when it falls upon the plants of the land. Much of the vegetable life that goes to make up this plankton has chlorophyll in it, or something which is a variety of chlorophyll—the colouring matter of green leaves—and by virtue of this it has the power of feeding on the gases dissolved in sea-water, just as land plants feed on air.

**WHAT IS A SPONGE?**

Every sponge was once alive. The best way of putting the answer to this question, perhaps, is to say that a sponge is the skeleton of a living

creature. By skeleton we simply mean the supporting framework of a body. The skeleton of any of the higher kinds of animals is made of bones, and a sponge, of course, is not made of bones nor of bony material, but it is a skeleton nevertheless.

The creatures which make sponges and live in them are of a very humble kind, and inhabit sea-water; they are far lower in the scale of animal life even than worms or oysters or star-fishes. We must not think of the sponge as the skeleton of a single animal; as a matter of fact, it is made by a colony of very simple creatures which live and work together, so to speak. Instead of being separate from each other and swimming about, they make a colony. As their numbers increase, so the sponges they live in increase in size.

The material of which sponges are made is all derived by the creatures from the sea-water in which they live. There is only one kind of sponge that is of much use to us—that which forms a more or less soft skeleton. But other kinds of sponges take other materials out of the sea-water and make a skeleton out of them. Thus, some sponges are quite hard and stony, being derived from the salts of silicon which are in sea-water; and others have a more chalky kind of structure.

In every one of these cases the great marvel is the chemical power of the tiny animals which pick out from the various salts dissolved in sea-water just those which they require, and then build them up into the wonderful thing which we call a sponge.

**HOW DOES A SPONGE HOLD WATER?**

The behaviour of a sponge with water is similar to that of a lump of sugar. It is not easy to understand so long as we study a complicated thing like a sponge or a lump of sugar, but we get the key to it if we study what is really a simpler case of the same thing, and that is the behaviour of a fine glass tube. Any kind of tube will do, but a glass one is convenient because we can see what is happening inside it; the finer the tube, the more clearly shall we see what happens. A very fine tube is rather like a hair, and so this subject which we are studying is called *capillarity*, from the Latin word for a hair. If we take such a tube

and dip it into water, we shall find that, without our sucking the tube, the water runs up inside it to a higher level than outside; and the more hair-like the tube, the higher the water will run.

Other fluids, however, will not behave in the same way as water. Mercury, for instance, will be pressed down by the tube, and will stand at a lower level inside it than outside. All we can say is that the surface of the water catches on to the side of the tube and creeps up it a little way.

Now, a sponge or a lump of sugar is really a very complicated system of little irregular tubes, and water behaves with regard to them just as it does with regard to a simple single glass tube. On the other hand, mercury will not run up at all either into a lump of sugar or into a sponge. The rising of the water in the tube, or the sugar, or the sponge, has nothing whatever to do with the atmospheric pressure, and is therefore quite a different matter from its rising in a tube when the end of the tube is sucked by anyone.

**WHY DOES A LIQUID RUN UP A TUBE WHEN WE SUCK IT?**

We know very well that something we do makes the liquid run up the tube, for it stops doing so when we stop sucking, though, if we seal the top of the tube with the tongue, the liquid will not fall back. Now, when we feel that we are sucking the liquid up, we are apt to suppose that we are pulling the liquid up the tube; but this is not at all what is happening. Though it looks as if the liquid were being pulled or dragged up by something, it is really being pushed, and what pushes it is the air.

When we suck liquid up a tube we are lessening the pressure of the air inside the tube, and the pressure of the air on the surface of the liquid we are sucking squeezes it at once up into the tube where we have made room for it to go. We make the room, and the air pushes the liquid into it. Every kind of sucking, or suction, to use the proper word, is of the same kind. What seems like pulling is simply clearing the way so that whatever is behind can be pushed. If the air is thick and heavy, it presses harder than if it is thin and light. So in different states of the air, which usually mean different states of the weather, the height of the column of

any particular liquid that the air will push up a tube varies. More liquid will be pushed up when the air outside is heavy, and less when it is light. So if we make a tube and seal the top of it, we have an instrument that will measure the pressure of the air from time to time, and we call this a barometer.

**WHY DOES WATER FREEZE?**

This sounds quite a simple question, but, indeed, no one can answer it yet. We do not know why taking heat out of water should at last turn it from the liquid into the solid state. It is believed, however, that we are wrong in supposing that there is a perfectly sharp line between the liquid and the solid state of water or of anything else. It is probable that water turns into ice or ice into water through unbroken stages. Only in most cases, and certainly in that of water, these happen so quickly that we have not time to notice them. In other cases, as in that of sealing-wax, no one can say where the solid state ends and the liquid state begins.

If we are ever to learn why water freezes, we must certainly discover all we can about the nature of ice, and it is not difficult to find, in the first place, that all ice is made up of crystals. So we must understand crystals, and the reason why so many kinds of matter, when solid, form themselves in crystals.

This is a most difficult subject to study, but the laws of crystals are being very slowly worked out, and when that is done, perhaps we shall be able to say why it is that water freezes when it is cooled, although we cannot do so now.

**WHY DOES ICE TURN INTO A LIQUID WHEN IT IS HEATED?**

This question is, perhaps, really the same as the last, yet, in a way, it is easier for us to understand why ice turns liquid when heated than why water turns solid when cooled. We have a good working idea of what heat is. We look on it as a movement in the atoms and molecules of which matter is composed. Cold, we know, is simply the absence of heat. So we can understand why solids, especially a crystalline solid like ice, turn liquid when heated, because we can imagine the particles of them beginning to move to and fro so rapidly that they can no longer hold together in the regular way required to make the crystals of a solid substance.



**WHERE ARE THE CLOUDS WHEN THE SKY IS QUITE CLEAR?**

Clouds, as we know, are made of water, and water can exist in the air in many different forms. When it forms a cloud, it is really in the form of liquid drops, like the collection of drops that forms a cloud from our breath on a frosty day.

The water that formed the clouds is still in the sky when it is cloudless. What has happened, however, is that, partly owing to the warmth of the sun, and partly, no doubt, to electrical conditions in the upper air, the air is capable of holding all the water in it in gaseous form.

This gaseous water, or water-vapour, is just as transparent as air itself; indeed, it is much better for us to regard water-vapour as one of the things that make up the air, just as much as oxygen or nitrogen. It is difficult for us to realise, perhaps, when we look up at the sky on a cloudless day, that we are looking through water, but we are certainly doing so just as if we had our eyes open under water and were looking up. If it were not for the water that forms part of the air, we should be utterly scorched by the heat of the sun. As it is, however, most of the sun's heat is caught by the water-vapour, which is very opaque to heat, though it is very transparent to light.

**WHERE ARE THE FISHES THAT LIVED IN THE SHELLS WE FIND BY THE SEA?**

The fishes that lived in these shells have died. In some cases they have been eaten by other creatures. More often, probably, they have died, and then their bodies have been gradually dissolved by the sea-water, and have also been digested by the tiny creatures, too small for us to see, that live in sea-water. The shells made by these fishes are really their skeletons, and, being harder than the rest, they remain behind when the animal dies, just as the skeleton of a land animal or of a sponge remains.

Now, if we compare these skeletons with the skeleton of a real fish, we at once see that these creatures are not fishes at all. We only call them fishes, or shell-fish, because they live in the sea, but they are utterly unlike fishes in every respect. They are, indeed, more unlike fishes than fishes are

unlike ourselves. Fishes, like ourselves, belong to the great group of backboned animals which have their skeletons inside their bodies, and though they are the lowest of all backboned animals, and we are the highest, yet we belong to the same class. Shell-fish have no bones of any kind, but they make their skeletons on the outside of their bodies. In all the other details of their lives and structure they differ completely from even the simplest of the real fishes.

**WHEN BEES TAKE HONEY FROM FLOWERS, DO THE FLOWERS GET ANOTHER SUPPLY?**

It is a mistake to suppose that bees get ready-made honey from flowers. No flowers contain honey as we know it; honey is a thing specially made by the honey-bee from materials derived from the flower. The sugary material produced by the flower is not honey, and does not exist to serve the bee. It is made by the flower for its own purposes, but it serves the flower indirectly, because the visit of the bee is of value in helping to fertilise it.

The flower does get more of this material, although it can by no means make a fresh supply at once, because the production of the sugary substance, to which the bee helps itself, is a long and difficult chemical process, depending upon sunlight, the drawing up of water from the soil, and the slow building up inside the plant of sugar and other very complicated chemical materials from the very simplest things.

**HOW IS A DELTA MADE?**

We must first of all understand what a delta is and why it has that name. If we look at the map of Egypt, we shall find the Nile, which is a very good example of a river with a delta at its mouth, and we shall notice how the river, when it meets the sea, spreads out into a shape something like a triangle. Now, that is the shape of the Greek capital letter D, the name for which is *delta*; and so this shape, made at the mouth of such a river as the Nile, is called its delta.

When a river meets the sea, the water of the river runs into the sea. The tides of the sea also affect the river, and salt water will be found for a certain distance up the river, and also various forms of animal and vegetable life, principally fishes, which live in

sea-water. Also, for a certain distance up the river, varying very much in different cases, the height of the river will rise and fall with the tides. We can see this, for instance, in the docks upon the river of any great port.

But a river consists of moving water, and the motion of the water has power to rub away from the bed and from the banks of the river a large quantity of solid material, which is not melted or dissolved in the river-water, but is carried down by it. Now, when the river-water meets the sea its pace slackens, because it is opposed by the weight of the sea-water. Therefore, the solid matter held in the river-water is apt to sink and form a great wide bed or bank of mud. When, as in the case of the Nile, there are two or more main branches, the deposit enclosed by these and the sea takes the form of a triangle. Deltas are nearly always found at the mouths of those rivers flowing into lakes, or enclosed seas, or sheltered gulfs, because there is in all these cases an absence of opposing currents.

**WHY ARE SOME THINGS GOOD FOR GROWN-UPS AND NOT FOR CHILDREN?**

Perhaps the real truth of the matter is that grown-up people and children do not differ from each other so much, after all, and the things which are really bad for children are not very good for grown-up people; but it is certainly true that things which would injure children very much may not hurt grown-up people.

There are three reasons for this. One is that, as children have very small bodies, it naturally takes a much less quantity of harmful things to hurt them. Another reason is that the body has great power of learning to protect itself against harmful things, and so in many cases grown-up people are able to take these things, such as tobacco or alcohol, without injury, not because they are grown up, but because their bodies have learnt how to do so. Even a grown-up person taking tobacco for the first time is apt to suffer severely.

But the third reason is the most important. It is true of all kinds of living beings that they are more easily injured when they are developing. We can understand in a way how this must be, for developing is a very much more delicate and difficult process,

surely, than merely continuing in the same state, which is all that the grown-up body has to do; and so we may expect that the developing body must be more delicate, seeing that it has only one way of going right, and that there are so many ways of going wrong. Only those who have studied development can understand how grave is the effect of poisons, like alcohol and tobacco, upon the developing body of a child.

**WHY DOES A BOY'S VOICE BREAK AND NOT A GIRL'S?**

When a boy's voice breaks, it is because his voice-box is suddenly becoming rather larger. As a girl grows up to be a woman, her voice-box grows steadily in proportion to the rest of her body. But, for some reason, Nature prefers that men shall have much deeper and louder voices than women. In order that this shall be so, the larynx, or voice-box, must be much larger in proportion, and the vocal cords longer in men than in women.

This special change begins to happen when a boy is about fourteen or fifteen years of age. It is not really necessary for a boy's voice to break—that is to say, it is possible for his voice to get steadily and evenly lower. But, as a rule, this does not happen, and the reason is, not that there is anything the matter with the boy's voice-box, but simply that he has not learnt how to work it.

The muscles are getting bigger and heavier, the cords are getting longer, and this is happening very quickly, and, of course, it must mean that a new skill has to be acquired, just as if one had learnt to play perfectly on a very small violin, and then had to play on a full-sized one. That is why the boy has not the proper control over his voice, and sometimes speaks in a low pitch and then suddenly in a high one.

**WHY DOES A STICK MAKE A NOISE WHEN SWUNG IN THE AIR?**

All kinds of noises, however different from each other, and all kinds of musical notes, high or low, round or thin, are really of the same nature in the chief respect that they all consist of waves of a certain kind, produced in the air, as a rule, though they may be produced also in solids or in liquids. These sound waves are of a special kind, and

consist of a swinging to and fro of the tiny particles of whatever medium is carrying the sound—air, or water, or rock, or whatever it may be.

If air were not elastic it could not carry such waves, for the parts of the air pushed forward by anything would not swing back again, and so there would be no sound waves produced. Therefore, if we want to interfere with the travelling of sound, we use something like wood, or cotton-wool, or sawdust, and these things, not being very elastic, damp down the sound waves.

Not until we know what sound is can we hope to understand the answer to this question, but when we have learnt the main facts about sound, the answer is easy. Thus elastic air is disturbed when a stick is swung through it, for countless millions of atoms of the gases that make up the air are quickly moved aside to make room for the stick.

They strike the atoms next them, and, being elastic, they rebound. The atoms struck do the same, and for a little while all the atoms of the air are swinging backwards or forwards, and that motion makes the sound wave which we hear as a humming noise.

**IS IT POSSIBLE TO SEE THE SMALLEST THINGS?**

The smallest of all things that have ever been discovered are tiny particles of electricity, called electrons, which live inside and help to make up the atoms of matter. These things cannot be seen. Vastly bigger are the atoms which they go to make up. An electron compares with an atom as a speck of dust compares with a large ball. Atoms cannot be seen. If we take the most powerful of all microscopes, and use the light which is the best for the purpose—that is to say, violet light—and make all the conditions as perfect as can be, then the smallest thing that we can see will be roughly about five thousand times as large as an atom; and we have already seen that an atom is huge and vast compared with an electron.

The electron is probably the smallest thing there is, and all electrons from all kinds of matter seem to be exactly the same. But we do not need to go down to anything nearly so small as an electron, or even an atom, to pass beyond

the lower limit of our vision, although it is aided by the most perfect microscope.

In order to see a thing as a separate thing, it must not be smaller than half the length of the waves of the light that we are seeing it by. When we have reached that point, we have reached the final limit of all our vision in this direction. That is not to say that we cannot find clear proof of the existence of things too small to see, so that we can indeed see them "in the mind's eye."

**IS IT TRUE THAT WE CANNOT BLEED UNLESS A HOLE IS MADE IN OUR VEINS?**

It is true that our blood is shut in a set of closed tubes called arteries, veins, and capillaries, and we never can bleed, even to the slightest degree—say, when we brush our teeth—unless, somehow or other, a hole has been made in the wall of one of these tubes. A little scratch anywhere in the skin is certainly not likely to strike an artery, for these usually lie deep; nor yet a vein, for though many veins lie just under the skin, and though their walls are much thinner than those of an artery, they are too thick for a slight scratch to pierce.

In between the arteries carrying the blood from the heart and the veins which return it to the heart, the blood runs in tiny little tubes as slight as hairs, and therefore called capillaries, from the Latin name for a hair. These capillaries are simply everywhere, except in one or two special places where there are good reasons why they should be absent, such as the clear front part of the eye. If that is scratched, or even pierced, it does not bleed at all. Everywhere else the slightest scratch is likely to tear or cut a few capillaries, so closely do they lie, and then, of course, we bleed.

There is no pulse in the capillaries, and so the blood just oozes out; but if an artery is cut, like the artery we feel at the wrist, the blood leaps out in pulses.

There would be no sense or use in the blood at all if it simply went round and round in these closed tubes, and nothing happened until they were cut. But all sorts of things—except red blood-cells—are always passing in and out through the walls of capillaries, and that is why we have blood at all.

The next Questions are on page 5015.



## THE FLOOD AT LINTON FALLS

**SWOLLEN** to twice its usual size by long-continued rains, the River Wharfe raced between its banks with a noise like thunder. At Skipton it was no longer a peaceful river, but a wild torrent—grand, indeed majestic, in appearance, perilous to a degree to any who might come within the sweep of its impetuous course.

Heedless of all but play, two little boys were amusing themselves on the bank. Occasionally their laughter would rend the air as they tumbled about, one on top of the other. Then they would pick themselves up, and off they would go again.

Suddenly, one of them, a child only five years of age, slipped and fell into the torrent. In a moment he was swept away and carried downstream with great swiftness.

The screams of his companion attracted the attention of Kate Verity, a girl in a mill close by. Throwing down the book she was reading, she rushed out to see what was the matter. A glance was sufficient to tell her all. With amazing quickness, she decided what was best to be done. To have plunged into the river there and then was useless, for by this time, brief as was the period that had elapsed, the child had been carried a hundred yards down the stream. Promptly the plucky girl set off, running along the bank in pursuit.

CONTINUED FROM 4718



Barely thirty feet above the terrible Linton Falls she came level with him. A few yards more and nothing could save the boy from being carried into the white tumbling foam, and dashed to pieces on the sharp rocks below.

The girl did not hesitate for an instant. Into the rapid current she plunged, as shown in the picture above, and caught the boy as he came sweeping downward. Then followed a tremendous struggle. The force of the water seemed irresistible.

The girl, however, knew well what she was about. Throwing the child across her shoulder, she struck out; the current held her, and for a while she made no headway. But there was no hurry, no fear; not once did the steady, strong sweep of her stroke give way to haste or excitement. Slowly, inch by inch, as it seemed, she forged her way towards the bank. More than once she was carried against a rock, and her destruction seemed imminent; but she came through without mishap, and was soon near enough to the bank to be dragged out of the water, bleeding and almost insensible, still clutching the rescued boy.

For this gallant act, which so fortunately resulted in a successful rescue, the brave Yorkshire lass, Kate Verity, was awarded the bronze medal of the Royal Humane Society.

## THE JUDGE WHO IMPRISONED A PRINCE

WHEN King Henry V. of England was a youth, he and his brothers grew tired of the irksome ways of the court, and scandalised the king, their father, and the staid courtiers by their practical jokes and mad frolics.

Prince Henry often grieved his father by his reckless behaviour when in the company of his gay associates. He would disguise himself as a thief, and set upon and rob the men who had collected his father's rents. But he would reward honest, brave people, and his wild pranks seem to have been due more to boyish love of mischief and adventure

with some of their boon companions, and the feast ended in a riot, at which the city authorities had to interfere. The princes were angry at that, and as a result the Lord Mayor and aldermen were summoned before the king. He, however, soon dismissed them when they said they had merely done their duty in stopping a riot.

It was during another wild freak of this kind that one of Prince Henry's followers was charged and sentenced to imprisonment. When the prince heard what had befallen his favourite, he came to the judge, Chief Justice Gascoigne,



PRINCE HENRY GREW VERY ANGRY, AND DREW HIS SWORD UPON THE JUDGE

and to boisterous spirits than to any real liking for ill-doing. However, his conduct and that of his brothers ill became royal princes, and Prince Henry's familiarity with some of his future subjects vexed his royal father very much.

There is one story about Prince Henry, or Prince Hal, as the people liked to call him, which not only redounds to his credit by showing he could be staunch to a friend in trouble, and take punishment with good grace, but tells how a judge put justice before the favour of man. Prince Henry's brothers, Thomas and John, once supped far into the night

and ordered him to release his follower. But the judge, who feared the anger of the royal youth less than he feared the reproach of his own conscience, looked at him sternly, and told him justice must be done, though, at the same time, if the king willed, he could pardon the prisoner.

When Prince Henry saw that he could not overawe the judge, he grew very angry, and drew his sword on him threateningly. Then the judge called on him to recollect himself, and declared that he was there to fulfil his duty in place of the prince's own father, and that in his name he adjured him to

change his wilful conduct and set a good example to those who would one day be his own subjects.

"And now," he concluded, "because you are guilty of disobedience and contempt of this court, I commit you to the King's Bench Prison. There you will stay until the king's, your father's, pleasure is declared."

The hot-tempered prince acknowledged the justice of the judge's words, and, laying his sword down, bowed to the courageous man who had sentenced him, and was then taken off to prison. It is said that when the king heard of what had occurred, he expressed his happy fortune in having for one of his judges a man who was not afraid to administer justice, and for a son a youth willing to submit to it.

Shakespeare, who wrote a great deal about Prince Henry in his plays, makes the king, his father, say these words :

Happy am I, that have a man so bold,  
That dares do justice on my proper son ;  
And not less happy, having such a son,  
That would deliver up his greatness so  
Into the hands of justice.

Prince Henry afterwards treated Judge Gascoigne with much respect, recognising that if he could keep so strictly to enforcing the laws of the country, even against the heir to the throne, who in the natural course of events would one day be his sovereign, then he would not regard the favour of any man, but seek to do his duty to all.

When Prince Henry did come to the throne, he justified the people's trust in him, and Judge Gascoigne was one of the upright men he consulted. Shakespeare puts these words into the mouth of Henry V., when addressing the judge :

... Still bear the balance and the sword ;  
And I do wish your honours may increase  
Till you do live to see a son of mine  
Offend you, and obey you, as I did.

## THE BRAVE SCHOOLGIRL IN ENGLAND

THE deeds of many humble heroes and heroines are quite unknown, but they are all worthy of record. Julia Hatcher, a schoolgirl, lived at Moor-side, a lonely spot near Blandford, Dorset. One day, while she was at work in her house, she was startled by the sound of screaming.

Going to the door, she was horrified to see a huge bull tossing a boy in a field on the other side of the road. Again and again the infuriated animal rushed at the prostrate figure, lifted him on its terrible horns, and threw him backwards high into the air, so that he fell heavily to the earth.

The lad's death seemed but a question of moments. Realising this, Julia Hatcher rushed out to save him. It was a perilous errand, and one which seemed certain to prove fatal, for the furious bull was in no mood to permit interference.

But the girl's presence of mind was equal to the occasion. She remembered that bulls always shut their eyes when stoned, so as she hurried along she picked up the likely stones that lay directly in her path.

The moment she got within range she began to bombard the bull. Every stone did not take effect ; some went very wide of the mark. They served, however, to divert the animal's attention

from the boy—which, after all, was the main object. All the while she kept advancing till she got so near that it was impossible for her to miss her mark.

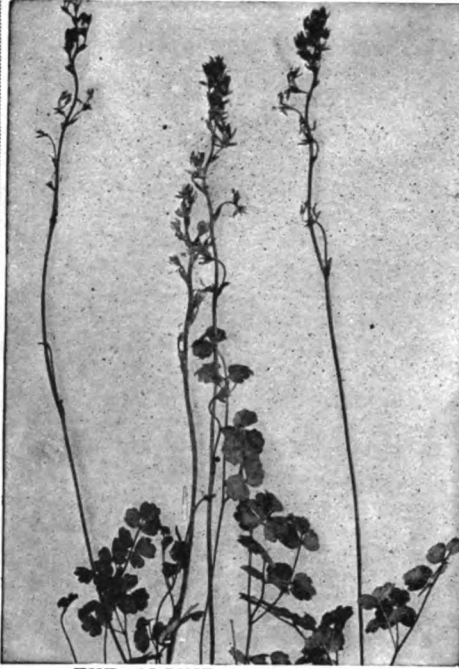
The bull resented these attentions, and several times he charged with lowered head. The girl stood her ground undaunted, meeting each fresh rush with a well-sustained shower of stones.

At length the bull paused, glared about him for a moment, and then turned tail. Prompt to improve her advantage, Julia followed, pelting him vigorously till he took himself off.

The courageous girl now turned her attention to the boy, who was by this time unconscious. He looked in a terrible condition. His clothes were torn to rags, and he was frightfully bruised and battered. Fortunately, no bones were broken. After a great deal of trouble, she restored him to consciousness. Eventually he recovered from the ill-effects of that terrible day, and quite regained his health.

Had she not acted so courageously and promptly, and had she not remembered that bulls close their eyes when stones are thrown at them, there is no doubt that the boy would have lost his life. For this brave action in facing a bull she was awarded a bronze medal.

The next Golden Deeds are on page 4957.



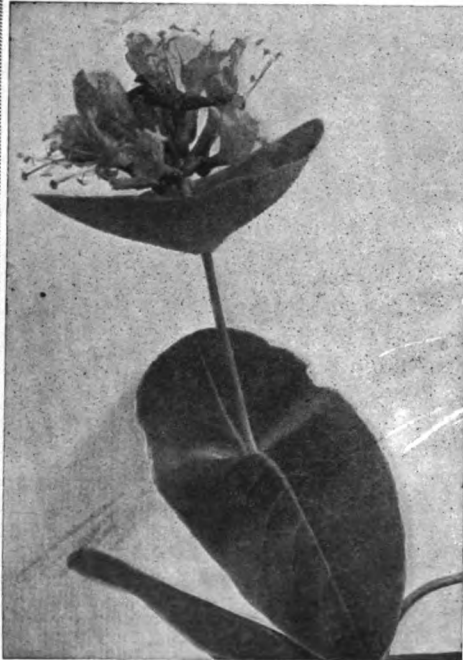
**THE ALPINE MEADOW-RUE**

This graceful little plant, with its purple flowers, is found principally upon the mountains of Wales and Scotland, where it grows to a height of about six or eight inches. It is a member of the buttercup family.



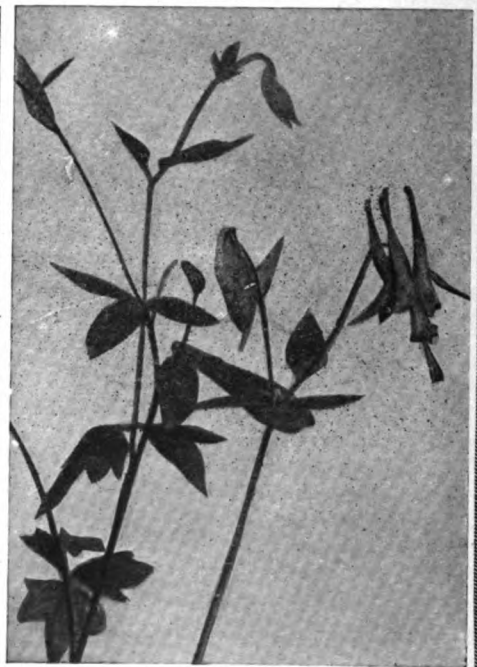
**THE MOUNTAIN SORREL**

This plant resembles the common sorrel of our meadows, but is shorter and stouter. The leaves grow on long stalks, and the green flowers are in clustered spikes. The plant grows in damp places on high mountains.



**THE GLAUOUS HONEYSUCKLE**

This honeysuckle is a midsummer bloomer, which stands upright, holding in its thick double leaves, as in a bouquet-holder, clusters of honey-coloured flowers resembling those of the cultivated honeysuckle.



**ROCK COLUMBINE**

The columbines all love to root themselves in crevices of rocky ledges, and this one is so sure to be found in such places that it is named rock columbine. It is a member of the buttercup family.





## FLOWERS OF ROCKY PLACES

MANY boys and girls are fortunate enough to live at the foot of some mountain. Some may even dwell in lonely farmhouses upon the slopes. These children have splendid chances for the study of wild flowers, for not only do the mountains provide many kinds such as we cannot find growing wild anywhere in the lowlands, but many of the lowland plants will also grow on the mountain-side. Some of the lowland plants will not grow at a greater height than a thousand feet above sea-level; and some mountain plants will not grow upon soil less than two thousand feet high and so on. On the other hand, we may find certain lowland plants growing at various heights.

The term "plants of rocky places" generally means, in America, those of hilly or mountainous country, as our beaches are chiefly sandy. They have no particular character, such as the fleshiness of maritime plants, except in the case of those growing upon the tops of high mountains. In such a position extremes of heat and cold have to be combated, drought is frequent, snow is often present near by, and the winds are terrific. Consequently only those plants, that,

CONTINUED FROM 4616.



through the ages, have adapted themselves to these conditions, survive. One finds that, usually, these "alpine" plants (as those which grow on mountain tops above timber-line are called, whether in the Swiss Alps or not) are peculiarly dwarfed, spreading mat-like, in squat, tufted masses, but with brilliant flowers larger than the size of the plant would seem to call for. This compact form, combined with masses of bloom and a certain resistance to drought and to heat and cold, has made the alpine vegetation welcome to the gardener, who plants them on the tiny hillocks he erects in his rockery, and finds that they continue to thrive and bloom.

The low stature of the plants, and their close-set branches are, of course, the best form with which to resist the winds, and meet their other trials. A tall plant would soon be blown off, and the trees, and shrubs, as well as the herbs found high on mountains, are so dwarfed, twisted and contracted, as to seem quite unrelated to others of their kind growing at the base. As for their brilliantly-hued, large flowers, it is said that "on the heights above the tree-line there is actually no spring and no autumn, only a short

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summer following a long winter. All the flowers have therefore to blossom in this short time, and all the flower-visiting insects must do their flying about during the short period which is free from snow, if they do not wish to starve." Therefore, as soon as the snow is melted the flowers appear in every colour, to allure the bees, butterflies and flies that depend upon their honey and pollen. By these means, the insects are satisfied, and in one way or another, they transfer pollen from the anthers of one flower to the pistil of another of the same kind.

There is one family which contains many of these alpine plants, — the Saxifrage family, the name meaning "stone-breaker" and given because the varieties so often spring out of cracks and pockets in cliffs, quite as if they had split the hard rocks to make room for themselves. But some of them, although growing on mountains of the Old World, belong to less elevated places in the New, especially in British North America, where they may be found far up in the Arctic Regions, where the climate is much like that of mountain peaks. Thence they sometimes follow the great, cool-topped mountain ranges into the United States, but, generally speaking, rarely occur south of Canada.

#### MOUNTAIN SAXIFRAGE

One such southward growing species is the yellow, or mountain saxifrage, that is found about the rock-rills that come down the mountain-sides, where its narrow, oblong leaves form large green cushions, a foot across. The flowering stems stand well above the cushions and bear a number of scattered flowers, whose yellow petals are dotted with red. The petals stand wide apart and the space is partly filled by the green sepals, upon each of which lies a golden stamen.

#### THE ROSE-ROOT

Another northern plant that is frequently cultivated is the rose-root, which is very closely allied to the saxifrages but is included in that curious family of fleshy plants the Orpines, which can flourish in the most

unlikely dry and barren places, and which include the live-forever, and the stone-crop. This one, however, unlike most of its family, likes rocks dripping with moisture, and produces thick, fleshy stems, and thick, gray-green leaves that are flat, nearly round, and more than one inch across. Its little, waxy flowers are grouped in massive heads varying from yellow to purple in tint. Its branching root-stock, when broken, exhales an odour of roses.

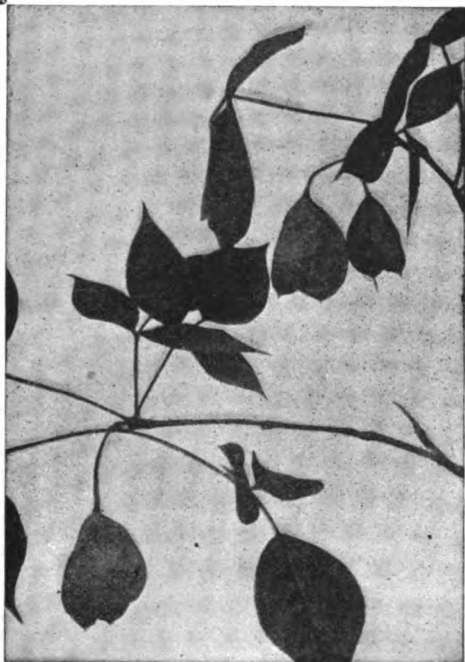
#### THE MOSS-CAMPION

A low habit like that of the saxifrages is to be noticed in several of the Pink family when rooted upon rocks. One of these is the moss-campion, a plant that is only an inch or two high with slender awl-shaped leaves. The stems grow in dense spreading tufts that look much like a growth of bright green moss into which somebody has stuck a number of pink or pale purple flowers.

These flowers have no visible stalks, and although they are only half an inch across, they look so big in proportion to the leaves that they appear to have been plucked from some larger plant, and set among moss. They are of similar structure to the red campion and white campion of lowland fields and hedgerows. Like the other, it is most frequent in the far north, as is the taller mountain sorrel.

#### MOUNTAIN SORREL

This herb we shall not fail to recognise as one of the relations of the common sorrel of lowland fields, although its kidney-shaped leaves differ so much from the common kind. Its spray of flowers however, allows us to make no mistake. Closely examined, they will be found to have only four sepals, while other sorrels and docks have six. It is not unlikely to be accompanied by the alpine meadow-rue, whose small leaves, with rounded leaflets in sets of three, are gathered into tufts. This herb does not look very much like the buttercups to whose family it nevertheless belongs, but closely resembles our other meadow-rues in its tossing tassels of stamens.



**THE BLADDERNUT**

These are the quaint pouch-like fruits which give its name to the bladdernut, — a shrub which in spring shows us white bells of flowers. The leaflets are in threes.



**THE YELLOW MOUNTAIN SAXIFRAGE**

This is another of the saxifrages, many of which grow only in the mountain regions of the North and in Ireland. It is found in wet places, and the flowers are yellow.



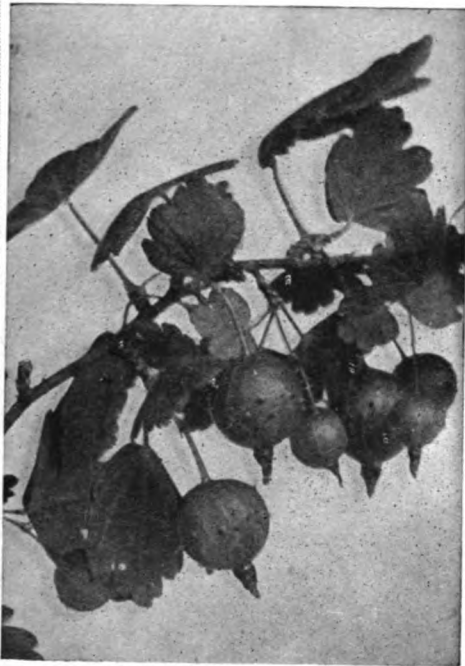
**THE DIERVILLA**

This bush honeysuckle, or diervilla, is a northern shrub that forms one of the most charming ornaments of the borders of streams, mirroring its sweet-scented golden blossoms in the water.



**THE MOSSY SAXIFRAGE**

This is a wild flower of the mountains that is frequently grown in our gardens. It is picturesque with its erect shoots bearing white flowers, and is useful in a rock garden. The leaves are divided into lobes.



**THE WILD GOOSEBERRY**

The American wild gooseberry flourishes in rocky woods, rooted in the clefts of cliffs and ledges. Its berries look like those of the garden bush but are smaller and more tart.



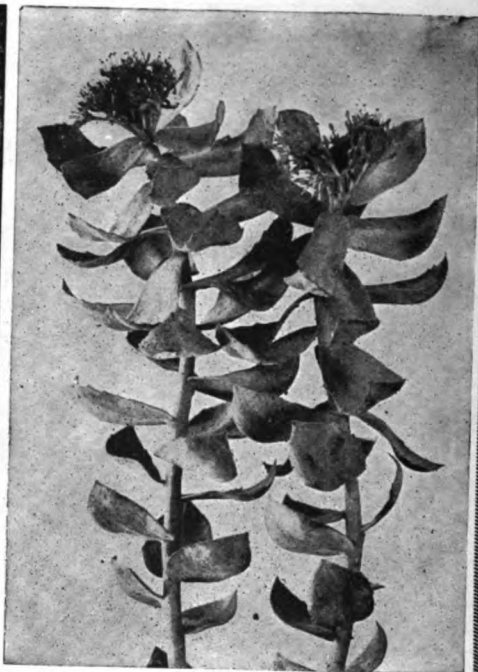
**THE BILBERRY**

The bilberry is a plant of many names, whortleberry, whinberry, and myrtleberry being most familiar. The leaves are egg-shaped, and the flowers flesh-coloured and wax-like. It is to be found on hill and mountain.



**THE WILD SPIKENARD**

The wild spikenard is one of the loveliest plants of our woods, its white, starry little flowers gleaming in the green shadows, and in autumn giving place to scarlet berries, which gleam in the shadow of the thickets.



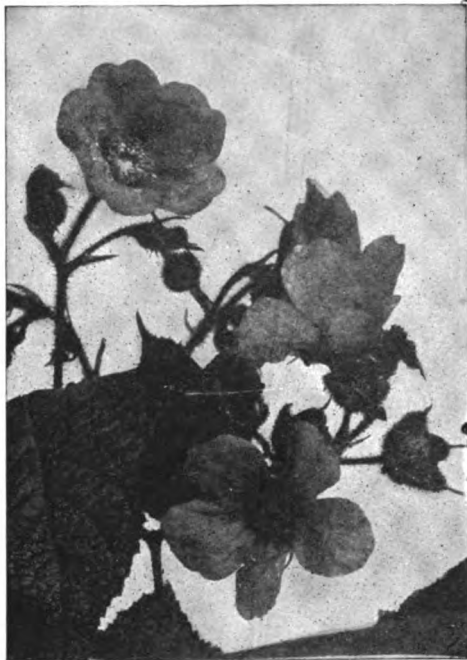
**THE ROSE-ROOT**

The rose-root is found only in the mountainous districts of the North and in Ireland. It is a relation of the stonecrop. The flowers grow in a dense mass at the tops of the erect stems, and are usually yellow in colour.



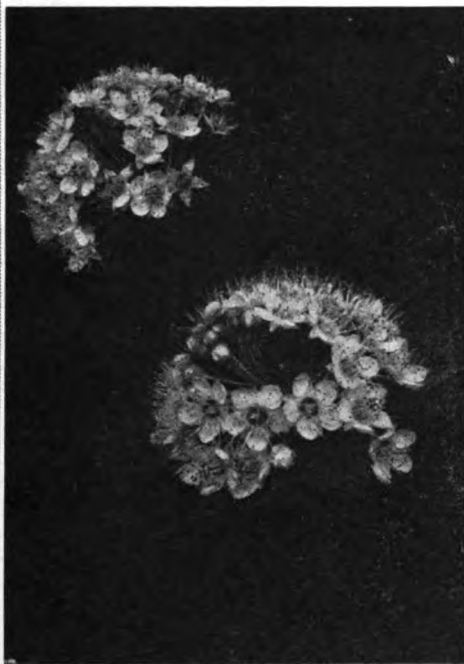
**THE GLOBE-FLOWER**

This large and handsome plant belongs to the buttercup family. Its flowers are pale yellow, and grow into the form of a ball or globe, from which fact the plant receives its name. It is often called wittes' gowan.



**THE FLOWERING RASPBERRY**

This gaudy bush shows itself a kind of raspberry, but its flowers alone might deceive one into thinking it a wild rose, to which family it belongs. Its fruit is more pretty than tasteful. It blooms during late summer.



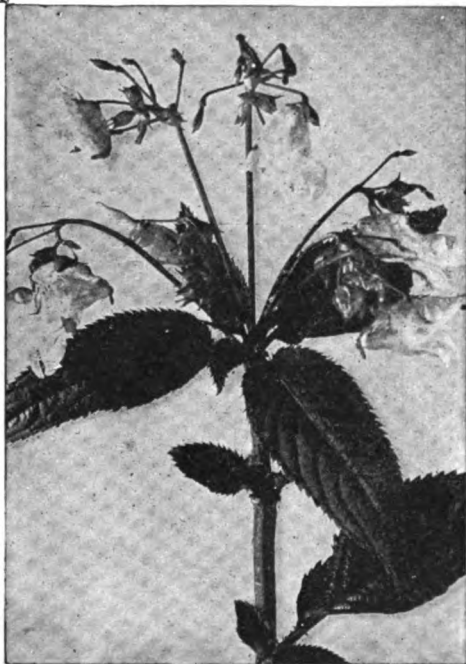
**THE NINEBARK**

The ninebark has long drooping branches, often swaying down to the grass, in midsummer loaded with ball-like clusters of lovely little snow-white blossoms. It belongs to the rose family.



**THE MOSS-CAMPION**

This densely-tufted, mossy plant, with the pink and white flowers and the awl-shaped leaves, grows only on the summits of our higher mountains, where it adds a gay touch of colour.



**THE BALSAM**

The balsam, or jewel-weed, grows in mountain swamps. Its golden flowers quiver on slender stalks; the ripe seed-vessels open at the slightest touch, ejecting the seeds, whence another name—touch-me-not.



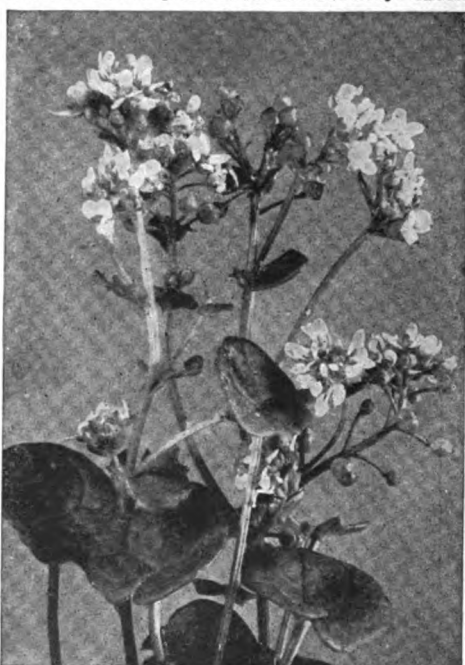
**THE LONDON PRIDE**

We know this plant, which grows wild on the mountains of Ireland, as the none-so-pretty, or St. Patrick's cabbage of the garden. The name London pride is due to the fact that the plant thrives even in smoky London.



**THE SEA-PINK**

The sea-pink, or thrift, is found on seashores and the tops of mountains. The fleshy leaves grow in dense tufts, and the rose-coloured flowers in round clusters at the ends of the stalks. It is often grown in gardens.



**THE COMMON SCURVY-GRASS**

The scurvy-grass is not a grass at all, but is a member of the cabbage family. It is a small plant with white flowers, and grows usually on muddy seashores, but it is also frequently found on lofty mountains.



**THE COLUMBINE**

Neither would the columbine suggest a buttercup, although a member of the latter's family, as it flaunts its jewel-like gold and scarlet flowers on rocky hillsides. Fitted as they are on slender stems, that are thrust out from tiny clefts in a rock-face, the columbines tremble in every whiff of wind, and send their yellow pollen flying, to alight on the outstanding pistils of other columbines. Nor are they neglected by insects, though only those with long tongues can reach up into the tips of the horns, where the honey-drops are. Humming-birds stab flower after flower, thrusting them back against the rock with their rapid assaults as they swiftly probe each spur. In the American species the horn-like spurs of the petals are not so strong and hooked as those of Europe, whose size gave rise to the quaint notion that they resembled the necks of doves billing across the stem; whence the name columbine from the Latin word *columba*, meaning a dove.

**THE BILBERRY**

High on the northern mountain ranges of both hemispheres we find the great bilberry, a thick-leaved little shrub with blue-black, bloom-covered berries that the Scotch call bleaberry. It belongs to the Huckleberry family, is a near relative of our huckleberries and of the European whortleberry or myrtleberry, and looks very like them.

Its nearly closed, waxy, white or pinkish bells bend stiffly downwards, and when a bee clings to the flowers' opening, and pushes its tongue in to reach the nectar, its head is almost certain to push against the tails of the anthers; and the act, by tilting the tube of the anther and springing the tip, in which there is a chink, away from the pistil, allows a shower of pollen to fall upon the bee's face. We can see from the position of the pistil that when the bee visits the next flower, this pollen will be scraped off upon the stigma.

**THE WILD GOOSEBERRY**

There is one little bush, easily recognised, for it closely resembles the

cultivated gooseberry, and, in fact, is merely a wild species of gooseberry. It is apt to grow in shady woods, in pockets of the rocks and often the slender branches, bent down by the weight of the pale-green, spiked berries, droop from the ledges of high cliffs. It furnishes a tart, wild fruit for sweetmeats, more highly flavoured than the tamer kinds, but more generous as to prickles, although these are somewhat softened by cooking.

**THE FLOWERING RASPBERRY**

Near the gooseberry, but on sunnier ledges, grows another scraggly, brittle-stemmed bush, bearing fruit quickly identified as raspberries, — but very dry and unpalatable raspberries. The whole shrub is furry in appearance. The great maple-like leaves are softly green and the crumpled, magenta-coloured petals emerge from a collection of hairy sepals and stems. Even the bright scarlet, flattish, fruits are fuzzy. This is known as the flowering raspberry, and it blooms profusely during late summer, the flowers resembling those wild-roses in whose family the shrub is placed.

**THE GLAUCCOUS HONEYSUCKLE**

Several members of the tribe of honeysuckles, both upright shrubs and trailing vines, display themselves on our rough hillsides. One of the earliest plants to bloom is the fly-honeysuckle, with its pale yellow, twin flowers: much later comes the half-climbing, half-upright, glaucous honeysuckle, with its close branches of honey-coloured, green and purple-tinged flowers, very like those of the cultivated honeysuckles, but half hidden by the wide flaring cup formed beneath them by the union of the uppermost pair of leaves on the stalk.

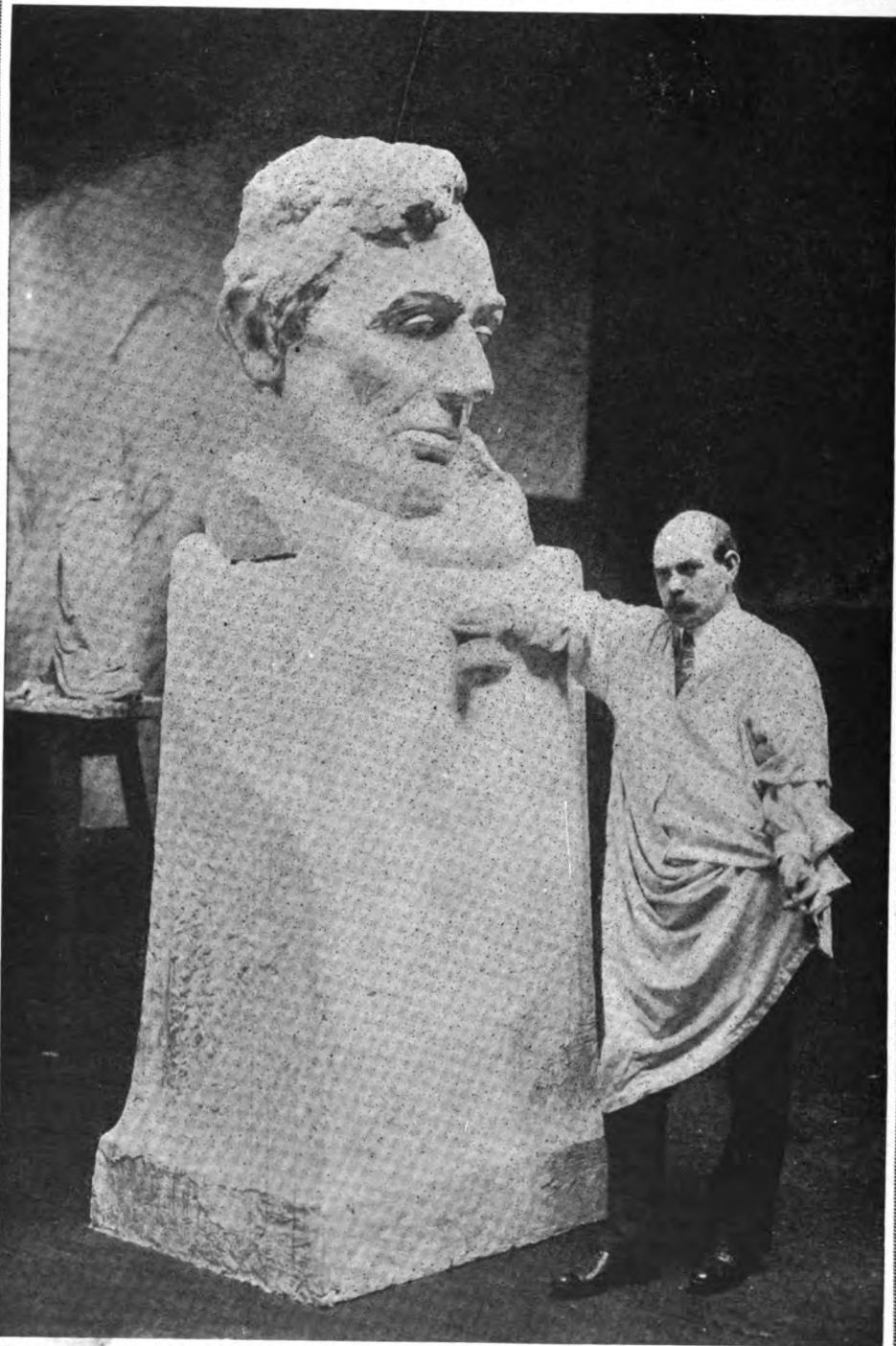
**THE DIERVILLA**

On dry and rocky ledges, especially common on the islets of the St. Lawrence River, blooms the bush-honeysuckle, or diervilla, which has long-pointed, opposite leaves and yellow flowers very attractive to bees and other winged insects.

Continued on page 496r.



## A HEAD THAT CAN NEVER BE FORGOTTEN



Here we see the sculptor, Gutzon Borglum, in his studio, putting the final touches on the colossal head of Lincoln, now in the Capitol at Washington. No one else has succeeded so well in showing one side of the character of this great man. It is a sad face, apparently feeling the weight of all the terrible war, with the suffering it brought. A copy of the head is in the College of the City of New York.



Robert Louis Stevenson by Augustus St. Gaudens

## AMERICAN SCULPTORS

**I**N this big storehouse of a world are many kinds of beauty. The painter cares most for beauty of colour, for the exquisite variations in light and shade and atmosphere. Beauty of line and form are what the sculptor feels most keenly. His longing is to reveal the beauty which he perceives in objects in their mass.

Painters were our pioneers in art. They had inherited the artistic traditions of old England, where for long there were no important sculptors. For many years it was impossible for a would-be sculptor to get necessary training in this country. He had to seek it in Italy, for at home he met with little sympathy. Puritan prejudices were against him. He saw no sculpture, nor was there opportunity to study modelling from life until late in the nineteenth century. The first casts from the antique brought to this country aroused indignant protest from our austere forefathers. Nor was there any available marble to be had here as yet. Nothing was known about casting bronze.

### A FRENCH SCULPTOR COMES TO AMERICA

In spite of all these difficulties, men of vigorous talent forced their way to success. An occasional visit from a foreign sculptor helped their cause. Thus Houdon came from Paris, in 1785, commissioned to make a statue of George Washington which is now in Richmond.

William Rush, born in Philadelphia in 1756, won distinction with cleverly carved figureheads for ships — The Genius of the United States for the frigate *United States*, the Indian Trader for the *William Penn*, Nature for the *Constellation*, and many others, some of which are still in existence. He was one of the founders of the Pennsylvania Academy of Fine Arts.

Horatio Greenough is not only one of the best known of our early sculptors but typical of many who sought inspiration in Italy. Born in 1805, son of a successful Boston merchant, he was surrounded by the best social influences of his day. A marble statue in his father's garden, copy of an antique, inspired his desire to become

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a sculptor. He read art books at the Boston Athenæum, and a stone-cutter taught him something of carving marble. As soon as he had been graduated at Harvard he went to Rome, where he found the great Thorwaldsen ready to lend him a helping hand. At the famous quarries of Carrara he learned to handle marble. He went from success to success, obtaining many important commissions, paying home visits but spending most of his life in Florence. There his studio became a meeting-place for gifted people, and American visitors took home from it a wider understanding of sculpture.

#### AN UGLY STATUE OF WASHINGTON

One of Greenough's best known pieces is a George Washington in classic attire which stands in the Capitol in Washington. His work, like that of most of his contemporaries, suffered from his unbounded enthusiasm for ancient art. As a result, our early sculpture is largely imitative. The ardent disciples tried in vain to catch the inspiration of the old Greek and Roman masters. They failed to realise that no really great work could be produced until they trusted their own knowledge of life.

#### THE MAN WHO MODELLED THE GREEK SLAVE

Hiram Powers, born in the same year as Greenough, had a harder time becoming a sculptor. His parents were poor, had many children, and Hiram had early to take care of himself. His skill in modelling led to employment in a dime museum, where he made wax figures. From this he turned to portrait busts, with which he was very successful. When thirty-two he had saved enough to go to Florence, where he found the atmosphere so congenial that he remained. The Greek Slave, familiar in most art museums, is his most famous work, and in its day received the highest commendation. It is lovely and pleasing, although to modern taste most of Powers' work seems somewhat tame. He had a genuine gift for portraiture, as is shown by his vigorous busts of Franklin, Webster, and others.

Thomas Crawford, another who

sought training in Rome, was heartily admired by Thorwaldsen. His gently imaginative work is more an individual expression than that of most of his predecessors. The Dancing Girl is perhaps the most popular today. He was the father of F. Marion Crawford, the writer.

Gradually American sculptors were coming into their own. They had feasted eye and spirit on ancient sculpture. They had learned their craft in foreign studios. The people, too, were becoming more appreciative. Copies and photographs were familiarising them with antique sculpture, and they began to enjoy its beauty. It no longer antagonised them. Sculptors began to discover that they could find success at home.

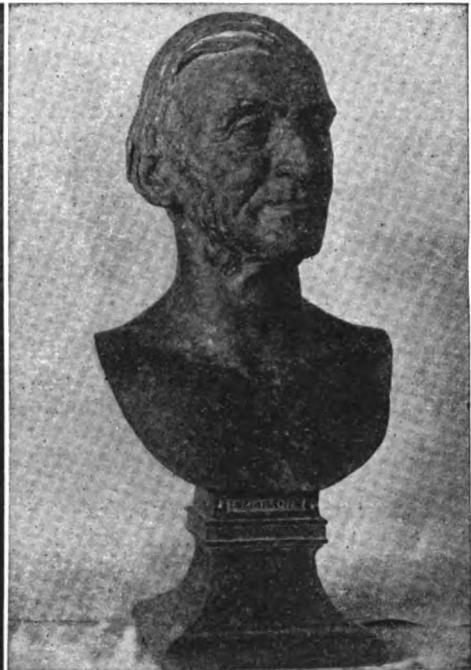
#### THE SON OF A JUDGE BECOMES A SCULPTOR

For many years William Wetmore Story enjoyed high international rank. During his long residence in Rome this brilliant and versatile man, writer and musician as well as sculptor, added prestige to his profession. Born in Salem, Mass., in 1819, he graduated at Harvard, and studied law before deciding to be a sculptor. He went to Rome in 1851, where his home soon became widely known as a gathering-place for the most distinguished people. Perhaps the influence of his enthusiasm and brilliant mind was even greater than that of his work. His Cleopatra, Libyan Sibyl, Semiramis and many portrait busts are among his most highly esteemed works. His son, Julian Story is a successful artist and lives in Philadelphia.

Erastus Palmer, born in 1817, is one of the many fine examples among our early sculptors of irrepressible talent finding expression. He was a young carpenter in Utica, N. Y., self-taught in art, when he cut a cameo portrait of his wife so cleverly that it led to many commissions for cameo portraits. He is said to have made over two hundred in two years. Eye-strain caused by such fine work led him to turn to modelling in clay. A bust of one of his children, called Infant Ceres, was greatly admired, executed in marble, and ex-



The first figure by Erastus Palmer is sometimes called *The White Captive*, though some have called it *The Indian Girl*. Notice its stiffness compared with Paul Wayland Bartlett's *Bear Tamer*, to the right.



The bust of Andrew Jackson, by Hiram Powers, is in striking contrast with the Emerson by Daniel Chester French, on the right. The sculptors feel the difference in the times as much or more than the painters do.

hibited at the National Academy of Design. From that time he was a successful sculptor. His *White Captive*, a graceful girlish figure, was considered one of the best things of the kind so far accomplished by an American. Palmer was especially successful with portrait busts of Alexander Hamilton, Commodore Perry, Washington Irving, and many others. He taught American sculptors an important lesson in self-reliance and that mastery of their art could be attained without foreign study. He was fifty-six before he saw Europe, and then he passed two years visiting the studios and treasures of foreign capitals.

#### THE MAN WHOSE PUPILS SUCCEEDED

Thomas Ball has told us in his interesting autobiography much of the conditions with which American sculptors had to contend before the Centennial Exposition. Born in Boston in 1819, the son of a house and sign painter, Thomas was employed as a boy in the New England Museum, where he found time to study drawing, engraving, and painting. His best talent, however, was for modelling, and his small figures and busts found ready sale. Shortly after his marriage, when he was about thirty, he took his bride to Italy, where they spent a happy two years learning much of his art, and enjoying the companionship of such gifted people as the Brownings and Hiram Powers. Among his most important works are the Washington in the Public Gardens, Boston; Edwin Booth as Coriolanus, in *The Actor's Home*, Philadelphia; the Emancipation Group, Washington; Daniel Webster, Central Park, New York. Mr. Ball has accomplished many works of different kinds, many commemorative monuments as well as imaginative pieces. Everything he did showed a vigorous grasp of his subject and a high degree of technical skill. During his long career he exercised an educating influence upon American sculpture, and many of his pupils became distinguished.

Clark Mills, born in New York State in 1815, should be mentioned for having made the first American equestrian

statue. This is the Jackson Monument in Washington. Mills had a sad childhood, early fatherless, brought up in the home of a harsh uncle. At thirteen he ran away and henceforth took care of himself. He had been farmhand, lumberman, millwright, and many other things before he began modelling in clay. He was about twenty, and although he had little or no training, was quickly successful, for his friends admired his work and gave him commissions. He had true Yankee ingenuity and overcame all difficulties by experimenting until able to accomplish what he wished. Thus he discovered a way of taking casts from the living face so that he could make likenesses cheaply, and this led to many orders. His bust of John C. Calhoun was purchased by the City of Charleston and brought him a gold medal.

#### HOW THE FIRST EQUESTRIAN STATUE IN AMERICA WAS MADE

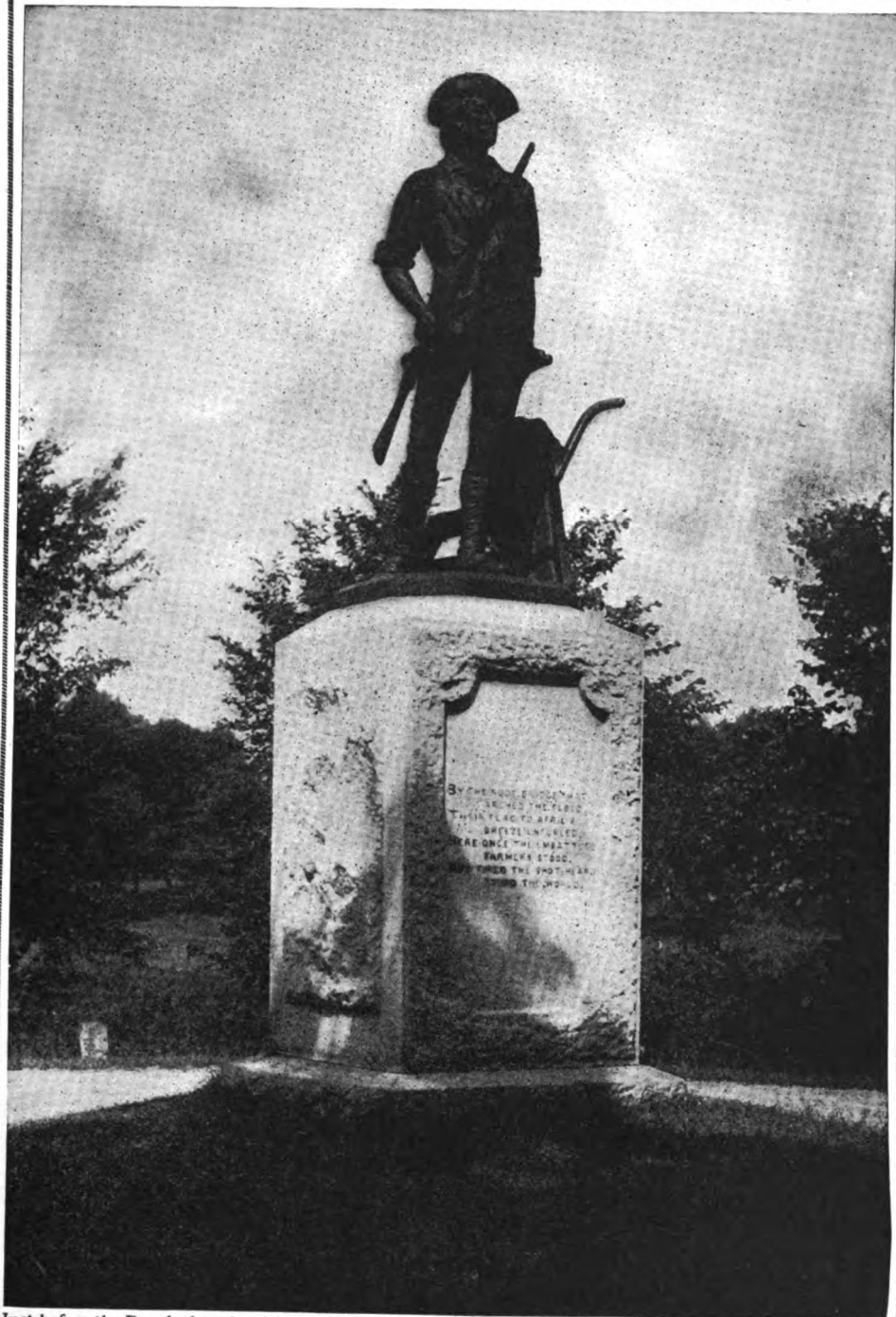
The president of the committee having the erection of the Jackson Monument in charge, invited Clark Mills to submit a design for it. He had never even seen an equestrian statue, yet, undaunted, he set to work and his design was accepted. The committee furnished the bronze from old cannon captured by General Jackson, and Mills contracted to do the work for \$12,000. From that time he was fully and successfully occupied.

William H. Rinehart, born in 1825, son of a Maryland farmer, had a hard time learning sculpture. He was stonecutter for a time, studying art in the night schools of Baltimore. When thirty he had saved enough to go to Italy. Upon his return he found himself so unhappy that he soon went back to Rome, where he spent the remainder of his life. Remembering his early hardships, he left money for a scholarship to help needy sculptors. By 1825 many American sculptors were accomplishing creditable work if not as distinguished as that which was to follow.

#### A WOMAN ENTERS THE FIELD

We have one famous woman sculptor of this early time — Miss Harriet Hosmer. Born in Watertown, Mass., 1830,

## A REMINDER OF THE REVOLUTION



Just before the Revolution, the citizens of New England were organized into bands of Minute Men, who were ready to resist the British at a moment's notice. This fine statue by Daniel Chester French stands in Concord, Massachusetts, where, on April 19, 1775, the Minute Men resisted the British, leaving their ploughs to seize their guns.



she was a frail child, and her father, a physician, encouraged her in tomboy ways, hoping to make her strong. Harriet rode and rowed, hunted and skated, made collections of eggs and bugs, and had a free, happy time. She studied drawing and modelling with a Boston artist, and then, because anxious to study anatomy, went to St. Louis, where the Medical College was one of the few institutions of the kind then admitting women. In 1852 her father took her to Italy and there for seven years she studied in Rome. She soon became a distinguished sculptor and figure in the art world. Her little figure of Puck was immensely popular, and she was called upon for many copies of it.

Important names thicken in the history of American sculpture. It is impossible to give many of them even brief mention.

#### A FAMOUS SCULPTOR WHO RECENTLY DIED

John Quincy Adams Ward, born in Urbana, O., had the childhood of a farmer's boy. His first modelling was the figure of an old negro done with clay from his father's farm. While visiting in Brooklyn he became a pupil of the sculptor, Brown. He could not have fallen into better hands, for under Mr. Brown's careful training he became an expert in handling both marble and bronze. His Indian Hunter, now in Central Park, was his first noteworthy work. Of his many achievements his Freedom is perhaps the best known. In 1896 Mr. Ward was elected President of the National Sculptors Association. His statue of Washington on Wall Street is shown in another place.

Daniel Chester French, one of our most highly esteemed sculptors, was born in Exeter, N. H., in 1850. Miss May Alcott, so well known as the Amy of Little Women, gave him his first lessons in modelling, for which she lent him her own tools. He was nineteen then and had discovered his talent in carving turnips. His father and step-mother gave him every encouragement and he had later the great advantage of studying in the Brooklyn studio of J. Q. A. Ward.

#### THE MINUTE MAN

He was only twenty-three when he accomplished successfully his first important commission — The Minute Man, which stands in Concord, Mass., to mark the site of the battle of Lexington. Among his achievements are the Gal- laudet Group showing the famous doctor of the blind teaching tenderly a little pupil; the statue of John Harvard at Harvard University; the Alma Mater at Columbia University; The Angel of Death and the Young Sculptor. He excels too in portrait heads. He has done some important pieces in collaboration with Edward C. Potter, the distinguished sculptor of animals. Mr. French's work is noted for serene beauty and distinction, and for a quality finely sympathetic which endears it to the general public.

Gradually Rome ceased to be the one place for which all young sculptors longed. For many years now they have been going to Paris, more and more, to the Ecole des Beaux-Arts and the studios of Parisian sculptors. America is justly proud of Augustus Saint Gaudens, by critics generally ranked as our greatest sculptor. In him seemed to flower the accumulated influences of foreign craftsmanship with striking individuality. He combined the sympathetic imagination and large conception of a poet with marvellous mastery of technique.

#### AMERICA'S GREATEST SCULPTOR

Saint Gaudens was born in Dublin, Ireland, in 1848. His mother was an Irish woman, his father a French shoe-maker. They came to the United States when Augustus was a baby and finally settled in New York. At thirteen he was apprenticed to a cameo cutter, with whom he worked for several years, devoting his evenings to the drawing classes at Cooper Union and the Academy of Design. All his life he was a tireless worker. When nearly twenty he was able to go to Paris, where with other men of genius he studied in the studio of Jouffroy. After three years in Paris, he went to Rome for three years more. In 1874 he returned to America and henceforth devoted himself to the important commissions which crowded



## TWO FINE STATUES IN NEW YORK'S PARKS



The Indian Hunter, by J. Q. A. Ward, is one of the best statues in Central Park. Every muscle is tense as the hunter crouches, awaiting the moment to loose his half-wild dog and bound forward after the game. One expects the figure to come to life at any moment.



You have read of David Glasgow Farragut of the United States Navy, in volume nine of our book. Here Augustus St. Gaudens has represented him as he would stand on board ship. The pedestal, which adds much to the impressiveness of the figure, is by Stanford White. The figure stands in Madison Square.

upon him. For many years his studio at Cornish, set in the beautiful rugged New Hampshire country, stood to American sculptors for the highest in ideal and craft. The amazing amount of his achievement, his unhalting succession of important works, show unvarying enthusiasm and power of concentration. Among his most representative pieces making fine appeal both to cultivated and to ignorant people, are the Admiral Farragut in Union Square, New York; The Shaw Memorial in Boston; his Lincoln and Sherman; his relief of Robert Louis Stevenson; the poignant figure of Grief in the Adams Memorial, Rock Creek Cemetery, Washington; the grim old Puritan, Deacon Chapin; the buoyant Diana on the tower of the Madison Square Garden, New York. In all his work — low relief, statues, portraits, monuments — he has known better perhaps than any other American sculptor, how to touch the heart in revealing both the material and spiritual beauty of his subject.

William Ordway Partridge is not only a sculptor, but in writings and lectures a distinguished teacher of his art. Born in 1861, a graduate of Columbia University, he studied in Paris and Rome. His talent, enriched by liberal education, has found refined and vigorous expression. Perhaps his portrait busts of Shakespeare, Tennyson, Shelley, Burns, Whittier, and many others in their widely different interpretations of character are as fine as anything Mr. Partridge has achieved.

#### THE MAN WHO LOVED TO MODEL ANIMALS

Paul Wayland Bartlett may be said to have inherited his talent; for his father was a sculptor and also a distinguished art critic. Paul was born in Boston in 1865. He received his training at the Ecole des Beaux Arts, Paris, which he entered at fifteen, working very hard but finding time to attend a course on animal sculpture at the Jardin des Plantes. It was necessary for him to earn his own living from an early age, and this he did by making clever little models of animals. This early work is somewhat freakish and grotesque. Later he accomplished some finely dramatic

models of animals, among which his Dying Lion and the Bear Tamer are highly esteemed.

He is a master in the art of bronze casting and his collection of bronze bugs, fishes, and reptiles attracted much attention in the Paris Salon of 1895. Among the important commissions he has executed are two of the circle of bronze effigies in the rotunda of the Congressional Library. His Columbus and his Michael Angelo are among his noteworthy works. They show imaginative realisation of the great sculptor, and the great discoverer, as well as a splendid vigour of execution. American visitors to Paris have reason to be proud of the young American sculptor whose equestrian statue of General Lafayette in the Place du Carrousel has been highly commended by leading sculptors at home and abroad.

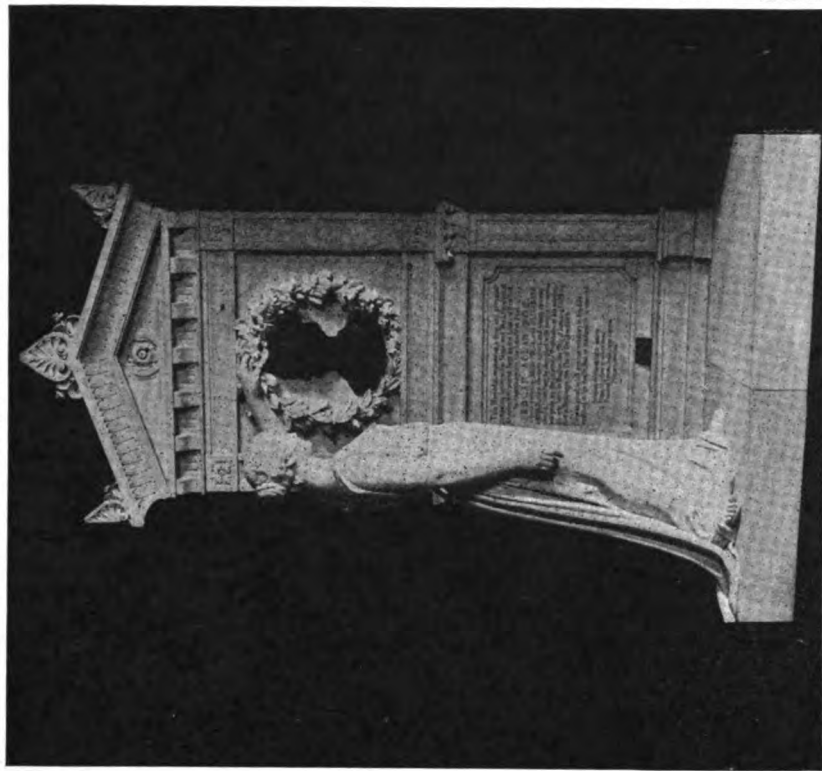
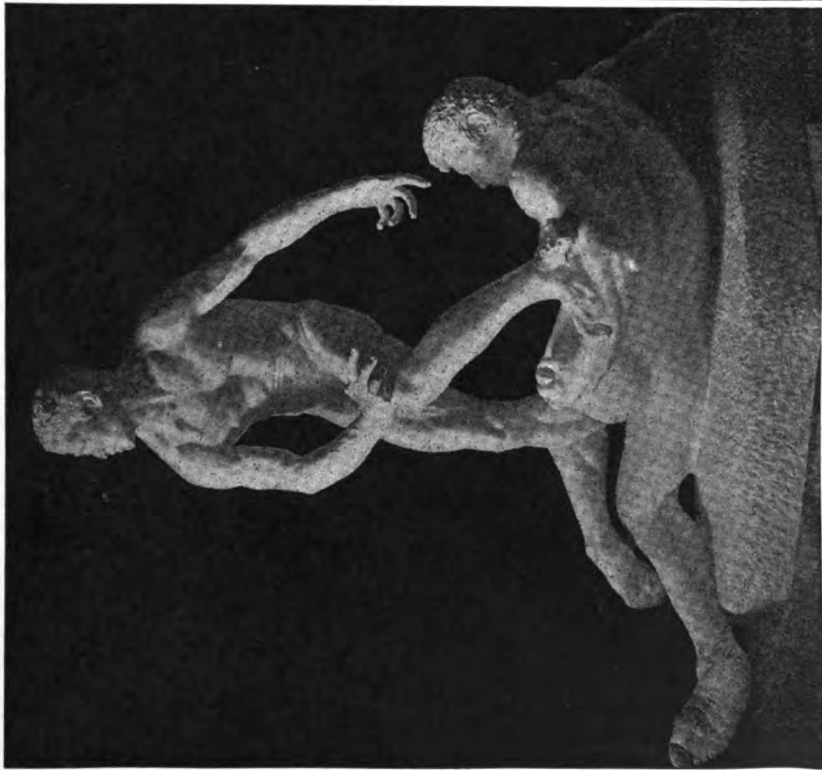
#### THE MAN WHO WORKS ALL THE TIME

George Gray Barnard is often claimed as our most original sculptor. He is distinctively American, seeking to reveal the greatness and promise, the crudity too, perhaps, of his native land. He is an out-of-door man. Born in 1863, in Iowa, much of his youth was spent roaming about the country studying the ways of birds and beasts and trying to model these in the local clay. Finally he went to Chicago, where for a time he worked with an engraver and then decided to become a sculptor. He entered the Chicago Art Institute and while there made a child's bust for which he was paid \$350. With this small sum he went to Paris, where he lived in seclusion, working hard and living meagrely until he fairly earned success. In 1894 he was ready to exhibit his works, which aroused great interest and admiration. Those who clung to conventional methods were somewhat repelled by his daring innovations, but always his vigour and daring has won respect. Among his best known works are Brotherly Love, The Two Natures; The Hower. He has for some years been engaged upon the sculpture for the Capitol of Pennsylvania.

#### TWO BROTHERS WHO HAVE WON RECOGNITION

Another of our younger sculptors, Solon Borglum, has won his fame by

## TWO GROUPS THAT HAVE PECULIAR SIGNIFICANCE



The group on the left is by George Gray Barnard and is entitled *The Two Natures in Man*. It represents the constant struggle between bad and good which goes on in every one of us, and in this struggle sometimes one conquers and then the other. The Memorial to Edgar Allan Poe, perhaps our greatest poet, which stands on the right, is by Richard Hamilton Park. Both may be seen in the Metropolitan Museum of Art, New York City.

choosing characteristically American subjects. He was born in Utah in 1868, where his father — who had started life as a Danish wood-carver — had become a successful American physician. Solon had a wild and picturesque youth, roaming over the western prairie, becoming intimately acquainted with Indian life, and an expert cowboy on his father's ranches. For years he was a nomad, drifting rather aimlessly about the western country between Utah and the Pacific coast. At last he decided to study art, and with \$64 in his pocket, went to Cincinnati. He excels in portraying animals and is master of the technical difficulties in conveying sense of action. He may be called the sculptor of the virile west and all that he does is stamped with the romance of the frontier. On the Border of White Man's Land, Stampede of Wild Horses, The Lame Horse; The Last Round Up; are among his important works.

His brother, Gutzon Borglum, has also won fame, chiefly by his monumental and ecclesiastical works. His colossal head of Lincoln is wonderful, and he has also done the Twelve Apostles for the Cathedral of St. John the Divine in New York City.

The Middle West has produced several of our best known sculptors. Charles H. Niehaus was born in Cincinnati, O., of German parentage. He very early showed skill in drawing and after studying at the Cincinnati School of Design went abroad to Munich. There he won prizes and received commissions so that he returned to this country well on the road to success.

Frederick Macmonnies stands in the van among our distinguished later sculptors. He has already shown amazing versatility in choice of subject as well as great technical skill.

#### THE YOUNG SPY OF THE REVOLUTION

Macmonnies was born in New York in 1863, the son of a Scotch business man. He was a sixteen-year-old clerk in a jewelry store when his talent for modeling became known to Saint Gaudens, who took him into his own studio. No better fortune than such a master could have befallen him. He proved a diligent

pupil, working also in the night classes at the Academy of Design and the Art Student's League. Then he went to Paris to the Ecole des Beaux Arts. His work was aggressively bold and independent and from the start attracted attention as of great promise. In 1885 he took the highest prize open to foreigners. His first big piece of work, a Diana, won a mention at the Salon. It led to an order for the three bronze angels now to be seen in St. Paul's Church, New York. One of his most popular works is the statue of Nathan Hale, young martyr of the Revolution, bound, at the moment of his execution. It has called halt to many men and women hurrying through City Hall Park, New York. Macmonnies knows clearly what he wants to show. Of Nathan Hale he said:

"I wanted to make something that would set the bootblacks and little clerks around there thinking — something that would make them want to be somebody and find life worth living."

Macmonnies excels in vigour. His Bacchante suggests the joy of life to the most unthinking. The Columbian Fountain, made for the World's Exposition at Chicago, is one of his successes. He was twenty-seven when this commission, with \$50,000 to carry it out, was given him upon the recommendation of Saint Gaudens.

There should be named also H. K. Brown, who did the fine Washington in Union Square, New York; E. V. Valentine, Herbert Adams, F. W. Ruckstuhl, and many others.

#### THE INTEREST IN SCULPTURE INCREASING

We have many able sculptors now. In studios and art institutions at home and abroad they have learned the mastery of their art, how to handle clay and marble and bronze. They trust their own inspiration and have ceased to be slavishly obedient to the art traditions of the Old World. They are developing all over this great country an understanding of the value of sculpture. They are ennobling and beautifying our public buildings and the parks and squares of our cities with noble and genuinely American art.



## BARBARA FRIETCHIE

JOHN G. WHITTIER, the famous Quaker poet of America, who loved to sing of the quiet things of life, could tune his note to the heroic with no uncertain strain, as we find in this inspiring poem. It tells a story of the terrible Civil War, when the Southern States fought against the North. Lee and Stonewall Jackson were Southern leaders. Lee's soldiers had defeated the troops of General McClellan at Fredericksburg, which the poet calls Frederick Town, and the flags of the United States, from which the Southerners had broken away, had all been hauled down, except one, when Stonewall Jackson marched into the town. How Barbara Frietchie kept this flag of freedom flying, and how the rebel leader showed his respect for her, are told with dramatic vigour by the poet.

Up from the meadows rich with corn,  
Clear in the cool September morn,  
The cluster'd spires of Frederick stand  
Green-walled by the hills of Maryland.  
Round about them orchards sweep,  
Apple and peach-tree fruited deep,  
Fair as the garden of the Lord  
To the eyes of the famished rebel horde,  
On that pleasant morn of the early fall,  
When Lee marched over the mountain wall—  
Over the mountains winding down,  
Horse and foot, into Frederick Town.  
Forty flags with their silver stars,  
Forty flags with their crimson bars,  
Flapped in the morning wind: the sun  
Of noon look'd down, and saw not one.  
Up rose old Barbara Frietchie then,  
Bow'd with her four score years and ten;  
Bravest of all in Frederick Town,  
She took up the flag the men haul'd  
down;  
In her attic window the staff she set,  
To show that one heart was loyal yet.

Up the street came the rebel tread,  
Stonewall Jackson riding ahead.  
Under his slouch'd hat, left and right  
He glanced: the old flag met his sight.  
"Halt!"—the dust-brown ranks stood  
fast.  
"Fire!"—out blazed the rifle-blast;  
It shivered the window, pane, and sash,  
It rent the banner with seam and gash.

CONTINUED FROM 4694



Quick, as it fell from the broken staff,  
Dame Barbara snatched the silken scarf,  
She leaned far out on the window-sill,  
And shook it forth with a royal will.  
"Shoot, if you must, this old grey head,  
But spare your country's flag!" she said.

A shade of sadness, a blush of shame,  
Over the face of the leader came;  
The nobler nature within him stirred  
To life at that woman's deed and word.  
"Who touches a hair of yon grey head  
Dies like a dog! March on!" he said.

All day long through Frederick Street  
Sounded the tread of marching feet;  
All day long that free flag tossed  
Over the heads of the rebel host.  
Ever its torn folds rose and fell  
On the loyal winds that loved it well;  
And through the hill-gaps, sunset light  
Shone over it with a warm good-night.  
Barbara Frietchie's work is o'er,  
And the rebel rides on his raids no more.

Honour to her!—and let a tear  
Fall, for her sake, on Stonewall's bier.  
Over Barbara Frietchie's grave  
Flag of Freedom and Union wave!  
Peace and order, and beauty draw  
Round thy symbol of light and law:  
And ever the stars above look down  
On thy stars below in Frederick Town!

THE SEA

The spirit of freedom which one seems to absorb when in the full delight of a voyage over the sparkling sea has never been better rendered than in this poem by Barry Cornwall, whose real name was Proctor. In this case it is supposed to be an old sailor who is speaking, but the salty breeze, which the poet has so cleverly suggested by the swift movement of his verse, is familiar to us all. There is a certain infectious quality of actual pleasure in this song of the sea that makes us for the moment sharers of the old sailor's love for the life of the ocean, though we may be conscious that there is another side to it less attractive.

THE Sea ! the Sea ! the open Sea !

The blue, the fresh, the ever free !  
Wthout a mark, without a bound,  
It runneth the earth's wide regions 'round ;  
It plays with the clouds, it mocks the skies,  
Or like a cradled creature lies.

I'm on the Sea ! I'm on the Sea !  
I am where I would ever be—  
With the blue above, and the blue below,  
And silence wheresoe'er I go.  
If a storm should come and awake the deep,  
What matter ? I shall ride and sleep.

I love—oh, *how* I love—to ride  
On the fierce, foaming, bursting tide,  
When every mad wave drowns the moon,  
Or whistles aloft his tempest-tune ;  
And tells how goeth the world below,  
And why the south-west blasts do blow.

I never was on the dull, tame shore  
But I loved the great Sea more and more,  
And backwards flew to her billowy breast,  
Like a bird that seeketh its mother's nest ;  
And a mother she *was*, and *is* to me,  
For I was born on the open Sea.

The waves were white, and red the morn,  
In the noisy hour when I was born ;  
And the whale it whistled, the porpoise rolled,  
And the dolphins bared their backs of gold ;  
And never was heard such an outcry wild  
As welcomed to life the Ocean-child.

I've lived since then, in calm and strife,  
Full fifty summers a sailor's life,  
With wealth to spend, and a power to range,  
But never have sought nor sighed for change ;  
And Death, whenever he come to me,  
Shall come on the wide, unbounded Sea.

ALEXANDER SELKIRK

William Cowper, the famous English poet, has endeavoured in this poem to suggest thoughts that might have arisen in the mind of Alexander Selkirk as he stood on the highest point of his lonely island and surveyed the scene on which his fate had cast him. For Alexander Selkirk was the shipwrecked mariner whose adventures on an island of the Pacific suggested to Daniel Defoe the immortal story of "Robinson Crusoe."

I AM monarch of all I survey ;  
My right there is none to dispute ;  
From the centre all round to the sea  
I am lord of the fowl and the brute.  
O Solitude, where are the charms  
That sages have seen in thy face ?  
Better dwell in the midst of alarms  
Than reign in this horrible place.

I am out of humanity's reach ;  
I must finish my journey alone ;  
Never hear the sweet music of speech—  
I start at the sound of my own.  
The beasts that roam over the plain  
My form with indifference see ;  
They are so unacquainted with men,  
Their tameness is shocking to me.

Society, friendship, and love,  
Divinely bestowed upon men,  
O, had I the wings of a dove,  
How soon would I taste you again !  
My sorrows I then might assuage  
In the ways of religion and truth ;  
Might learn from the wisdom of age,  
And be cheer'd by the sallies of youth.

Religion ! what treasure untold  
Resides in that heavenly word !  
More precious than silver and gold,  
Or all that this earth can afford.  
But the sound of the church-going bell  
These valleys and rocks never heard—  
Never sigh'd at the sound of a knell,  
Or smiled when a Sabbath appear'd.

Ye winds that have made me your sport,  
Convey to this desolate shore  
Some cordial endearing report  
Of a land I shall visit no more.  
My friends, do they now and then send  
A wish or a thought after me ?  
O, tell me I yet have a friend,  
Though a friend I am never to see.

How fleet is the glance of the mind !  
Compared with the speed of its flight,  
The tempest itself lags behind,  
And the swift winged arrows of light.  
When I think of my own native land,  
In a moment I seem to be there ;  
But, alas ! recollection at hand  
Soon hurries me back to despair.

But the sea-fowl is gone to her nest,  
The beast is laid down in his lair ;  
Even here is a season of rest,  
And I to my cabin repair.  
There's mercy in every place ;  
And mercy—encouraging thought—  
Gives even affliction a grace,  
And reconciles man to his lot.

ETERNAL FATHER, STRONG TO SAVE

It is often said that many of the hymns used in our churches are deficient in literary quality ; poor examples of verse, though their piety may be unquestioned. That charge cannot be made against the following well-known hymn, written by W. Whiting in 1860. It might best be described as a prayer in verse, and the words are not unworthy of the thoughts.

ETERNAL Father, strong to save,  
Whose arm hath bound the restless wave,  
Who bidst the mighty ocean deep  
Its own appointed limits keep ;  
O, hear us when we cry to Thee  
For those in peril on the sea !  
O Christ, whose voice the waters heard,  
And hushed their raging at Thy word,  
Who walkedst on the foaming deep,  
And calm amid the storm didst keep ;  
O, hear us when we cry to Thee  
For those in peril on the sea !  
Most Holy Spirit, who didst brood  
Upon the chaos dark and rude,  
And bid its angry tumult cease,  
And give, for wild confusion, peace ;  
O, hear us when we cry to Thee  
For those in peril on the sea !  
O Trinity of love and power,  
Our brethren shield in danger's hour  
From rock and tempest, fire and foe,  
Protect them wheresoe'er they go ;  
Thus evermore shall rise to Thee  
Glad hymns of praise from land and sea.

# THE FERN AND THE MOSS

This little poem by Eliza Cook is really a lesson in plant life. Many instances could be given of what might be called the friendship of the plants, for it is not only the moss and the fern that are of use to each other. But the poet has chosen the best illustration for her purpose, and succeeds admirably in showing us that even the lowly forms of life may teach us a lesson in mutual helpfulness.

THERE was a fern on the mountain, and moss  
on the moor ;  
And the ferns were the rich, and the mosses  
the poor.  
And the glad breeze blew gaily, from heaven  
it came,  
And the fragrance it shed over each was the  
same ;  
And the warm sun shone brightly, and gilded  
the fern,  
And smiled on the lowly-born moss in its turn ;  
And the cool dews of night on the mountain  
fern fell,  
And they glistened upon the green mosses as  
well.  
And the fern loved the mountain, the moss  
loved the moor,  
For the ferns were the rich, and the mosses  
the poor.

But the keen blast blew bleakly, the sun  
waxed high.  
And the ferns they were broken, and withered,  
and dry ;  
And the moss on the moorland grew faded  
and pale.  
And the fern and the moss shrank alike from  
the gale.  
So the fern on the mountain, the moss on the  
moor,  
Were withered and black where they flourished  
before.

Then the fern and the mosses they grew wiser  
in grief,  
And each turned to the other for rest and  
relief ;  
And they planned that wherever the fern-  
roots should grow  
There surely the moss should be sparkling  
below.

And the keen blasts blew bleakly, the sun  
waxed fierce ;  
But no wind and no sun to their cool roots  
could pierce ;  
For the fern threw her shadow the green moss  
upon,  
Where the dew ever sparkled undried by the  
sun ;  
When the graceful fern trembled before the  
keen blast,  
The moss guarded her roots till the storm-  
wind had passed ;  
So no longer the wind parched the roots of  
the one,  
And the other was safe from the rays of the sun.

And thus, and for ever, where'er the ferns grow,  
There surely the mosses lie sparkling below ;  
And thus they both flourish, where naught  
grew before,  
And they both deck the woodland, and  
mountain, and moor.

# MISS POPPY

We have already been able to include in our BOOK OF POETRY a number of pretty little lyrics by Mr. Frederic E. Weatherley, the well-known song-writer, and it is by his permission that this little song of the poppy is given here.

TWAS on a summer morning,  
Walking through the corn,  
That I met a little maid  
Looking all forlorn.

She had a scarlet petticoat,  
So beautiful to see ;  
I wondered if this little maid  
Would ever marry me.

I bowed to her, I spoke to her,  
I gave her sweet good-day ;  
She only tossed her little head,  
And turned the other way.

But oh, I loved her dearly,  
And grew so very bold,  
I took her hand, I kissed her lips,  
Although they were so cold.

I took her in my loving arms,  
And carried her away,  
I said maybe she'll look on me,  
And marry me next day.

But when I came next morning,  
I found her dead, ah, me !  
She was only a scarlet poppy  
That had grown beside the sea.

# ALL THINGS BRIGHT AND BEAUTIFUL

There is no lack of children's hymns, though there are not a great many that have at once the merit of being suitable for singing in church or for reading as a little poem at home. But among the few with this double quality this hymn by the late Mrs. Alexander, whose "Once in Royal David's City" we have read on page 2152, takes high rank, by reason of its unstrained beauty and simplicity of thought and expression.

ALL things bright and beautiful,  
All creatures great and small,  
All things wise and wonderful,  
The Lord God made them all.

Each little flower that opens,  
Each little bird that sings,  
He made their glowing colours,  
He made their tiny wings.

The rich man in his castle,  
The poor man at his gate,  
God made them, high or lowly,  
And order'd their estate.

The purple-headed mountain,  
The river running by,  
The sunset and the morning,  
That brightens up the sky—

The cold wind in the winter,  
The pleasant summer sun,  
The ripe fruits in the garden—  
He made them every one ;

The tall trees in the greenwood,  
The meadows where we play,  
The rushes by the water,  
We gather every day.

He gave us eyes to see them,  
And lips that we might tell  
How great is God Almighty,  
Who has made all things well.



# RECESSIONAL

Mr. Rudyard Kipling would rank high among English poets if he had written nothing but this great poem. The title "Recessional" indicates, in a poetic way, the occasion of its writing. In the year 1897, England saw the gorgeous celebration of Queen Victoria's Diamond Jubilee, when from the remotest parts of the British Empire came the representatives of Britain's power, to take part in the triumphal procession through the streets of London, and a great naval review provided an imposing display of her strength upon the seas. Mr. Kipling published this "Recessional"—as the hymn sung when the congregation is leaving church is termed—to remind the English people that all they held was in the hands of God. It ranks easily among the great poems of the last century.

GOD of our fathers, known of old,  
Lord of our far-flung battle-line,  
Beneath whose awful Hand we hold  
Dominion over palm and pine—  
Lord God of Hosts, be with us yet,  
Lest we forget—lest we forget.

The tumult and the shouting dies ;  
The captains and the kings depart :  
Still stands Thine ancient sacrifice,  
An humble and a contrite heart.  
Lord God of Hosts, be with us yet,  
Lest we forget—lest we forget.

Far called, our navies melt away ;  
On dune and headland sinks the fire :  
Lo, all our pomp of yesterday  
Is one with Nineveh and Tyre.  
Judge of the Nations, spare us yet,  
Lest we forget—lest we forget.

If, drunk with sight of power, we loose  
Wild tongues that have not Thee in awe,  
Such boastings as the Gentiles use,  
Or lesser breeds without the Law—  
Lord God of Hosts, be with us yet,  
Lest we forget—lest we forget.

For heathen heart that puts her trust  
In reeking tube and iron shard,  
All valiant dust that builds on dust,  
And guarding, calls not Thee to guard,  
For frantic boast and foolish word—  
Thy mercy on Thy people, Lord. Amen.

## WHILE WE MAY

Some of the most beautiful poems in the world have been written by anonymous authors, and "While We May" is certainly worth the reading.

THE hands are such dear hands ;  
They are so full ; they turn at our demands  
So often ; they reach out  
With trifles scarcely thought about  
So many times ; they do  
So many things for me, for you—  
If their fond wills mistake,  
We may well bend, not break.

They are such fond, frail lips  
That speak to us. Pray if love strips  
Them of discretion many times,  
Or if they speak too slow or quick ; such  
crimes  
We may pass by, for we may see  
Days not far off when those small words may  
be  
Held not as slow, or quick, or out of place, but  
dear,  
Because the lips are no more here.

They are such dear, familiar feet, that go  
Along the path with ours, feet fast or slow,  
And trying to keep pace ; if they mistake  
Or tread upon some flower that we would  
take

Upon our breast, or bruise some reed,  
Or crush poor Hope until it bleed,  
We may be mute,  
Nor turning quickly to impute  
Grave fault ; for they and we  
Have such a little way to go, can be  
Together such a little while along the way,  
We will be patient while we may.

So many little faults we find—  
We see them—for not blind  
Is love. We see them, but if you and I  
Perhaps remember them some by and by  
They will not be  
Faults then, grave faults, to you and me,  
But just odd ways, mistakes, or even less—  
Remembrances to bless.  
Days change so many things—yes, hours ;  
We see so differently in suns and showers.  
Mistaken words to-night  
May be so cherished by to-morrow's light,  
We may be patient, for we know  
There's such a little way to go.

## LOVE AND FRIENDSHIP

We can always tell a song written by Thomas Moore, the famous Irish poet, as the melody seems peculiar to his verse.

"A TEMPLE to friendship," said Laura, enchanted,  
"I'll build in this garden—the thought is  
divine."  
Her temple was built, and she now only  
wanted  
An image of friendship to place on the  
shrine.  
She flew to a sculptor, who set down before her  
A friendship, the fairest his heart could  
invent ;  
But so cold and so dull that the youthful  
adorer  
Saw plainly this was not the idol she  
meant.

"Oh, never," she cried, "could I think of  
enshrining  
An image whose looks are so joyless and  
dim ;  
But yon little god, upon roses reclining,  
We'll make, if you please, sir, a friendship  
of him."  
So the bargain was struck ; with the little god  
laden  
She joyfully flew to her shrine in the grove :  
"Farewell," said the sculptor, "you're not  
the first maiden  
Who came but for friendship and took away  
love."

## OMISSION

IT is not the thing you do, dear,  
'Tis the thing you leave undone  
Which gives you a bitter heartache  
At the setting of the sun.  
The tender word forgotten,  
The letter you did not write,  
The flower you might have sent, dear,  
Are your haunting ghosts to-night.

MARGARET E. SANGSTER

### THANKSGIVING DAY

This pretty little poem, which has been set to music, was written by Mrs. Lydia Maria Child, a noted abolitionist.

OVER the river and through the wood,  
To grandfather's house we go;  
The horse knows the way  
To carry the sleigh  
Through the white and drifted snow,  
Over the river and through the wood—  
Oh, how the wind does blow!  
It stings the toes  
And bites the nose,  
As over the ground we go.

Over the river and through the wood,  
To have a first-rate play;  
Hear the bells ring  
"Ting-a-ling-ding!"  
Hurrah for Thanksgiving Day!

Over the river and through the wood,  
Trot fast, my dapple-gray!  
Spring over the ground,  
Like a hunting hound!  
For this is Thanksgiving Day.

Over the river and through the wood,  
And straight through the barn-yard gate,  
We seem to go  
Extremely slow—  
It is so hard to wait!

Over the river and through the wood—  
Now grandmother's cap I spy!  
Hurrah for the fun!  
Is the pudding done?  
Hurrah for the pumpkin pie!

### UNDER THE GREENWOOD TREE

UNDER the greenwood tree  
Who loves to lie with me,  
And turn his merry note  
Unto the sweet bird's throat—  
Come hither, come hither, come hither,  
Here shall he see  
No enemy  
But winter and rough weather.  
— WILLIAM SHAKESPEARE.

### THE LAUGHING BROOK

There is a pleasant sense of brightness and sparkle in this unpretentious little poem by an American writer named Elizabeth Scantlebury, who knows how to write verse for little folk.

"WHY do you laugh, little brook, little brook,  
And why so dimpled and gay?  
What did you hear as you came through the wood,  
And what did you see on the way?"

"Such fun as I've had! I saw in the wood  
The violets opening their eyes,  
The little ferns straightening out their curls,  
And Jack-in-the-pulpit rise.

"The sunbeams, in passing, threw me a kiss;  
The breezes whispered to me;  
And the tiny pebbles tickled me so  
I couldn't help laughing, you see."

### BLESSED ARE THEY THAT MOURN

William Cullen Bryant, an American poet, seeks in these verses to give poetic expression to one of the sayings of Jesus: "Blessed are they that mourn, for they shall be comforted." Nothing that man can write can make the words of Jesus appear more wonderful, but these verses are very beautiful, and full of comfort and hope.

OH, deem not they are blest alone  
Whose lives a peaceful tenor keep;  
The Power who pities man has shown  
A blessing for the eyes that weep.

There is a day of sunny rest  
For every dark and troubled night;  
And grief may bide, an evening guest,  
But joy shall come with early light.

For God has marked each sorrowing day,  
And numbered every secret tear,  
And heaven's long age of bliss shall pay  
For all His children suffer here.

### O MAMMY'S PICKANINNY

This pretty little poem by Mrs. Lilla T. Elder will appeal to the little folks, whether of the North or South.

DEY say dat in de winter in de norf it mostly  
snows,  
De skies am black an' dark, an' a-roarin' col'  
wind blows.  
Ef you wuz dar, ma honey, you would freeze  
dose little toes,  
An' you couldn't look about yer widout  
mufflin' up yer nose,  
O mammy's pickaninny.

Heah de roses bloom aroun' us an' de yaller  
jasmine grows,  
De gret big sun's a-shinin' as de corn stands  
in rows—  
O, wat's good fer coloured poor folks de Lord  
in heaben knows.  
So keep right on, ma honey, kickin' up dose  
little toes,  
O mammy's pickaninny.

### TO THE FRINGED GENTIAN

William Cullen Bryant's poems to the waterfowl, found elsewhere in this book, and the fringed gentian are almost unexcelled as nature poems.

THOU blossom, bright with autumn dew,  
And coloured with the heaven's own blue,  
That openest when the quiet light  
Succeeds the keen and frosty night;

Thou comest not when violets lean  
O'er wandering brooks and springs unseen,  
Or columbines in purple dressed,  
Nod o'er the ground-bird's hidden nest.

Thou waitest late, and com'st alone,  
When woods are bare, and birds are flown,  
And frosts and shortening days portend  
The aged year is near his end.

Then doth thy sweet and quiet eye  
Look through its fringes to the sky,  
Blue—blue—as if that sky let fall  
A flower from its cerulean wall.

I would that thus, when I shall see  
The hour of death draw near to me,  
Hope, blossoming within my heart,  
May look to heaven as I depart.

## LITTLE VERSES FOR VERY LITTLE PEOPLE

**R**OBIN HOOD, Robin Hood,  
Is in the little wood.  
Little John, Little John,  
He to the town is gone.

Robin Hood, Robin Hood,  
Is telling his beads,  
All in the green wood,  
Among the green weeds.

Little John, Little John,  
If he comes no more,  
Robin Hood, Robin Hood,  
He will fret full sore.

**O**LD King Cole was a merry old soul,  
And a merry old soul was he ;  
He called for his pipe, and he called  
for his bowl,  
And he called for his fiddlers three.



For every fine fiddler had a fine fiddle,  
And a very fine fiddle had he ;  
So old King Cole was a merry old soul,  
And a merry old soul was he ;  
He called for his pipe, and he called  
for his bowl,  
And he called for his fiddlers three.

**I**F the old woman who lived in a shoe  
Had lived in a cottage instead,  
Her children could have played at hide-  
and-seek,  
And needn't have been sent to bed.

If little Bo-peep hadn't lost her sheep,  
She wouldn't have had to find them.  
If Little Boy Blue had not any sheep,  
He wouldn't have had to mind them.

If the goose that laid the golden eggs  
Had not been killed that day,  
She'd still be laying golden eggs  
As hard as she could lay.

In fact, if we could manage things,  
How different they would be !  
But as we can't we'll let them stay  
Just as they are, you see.

**I** OFTEN sit and wish that I  
Could be a kite up in the sky,  
And ride upon the breeze, and go  
Whatever way it chanced to blow ;  
Then I could look beyond the town,  
And see the river winding down,  
And follow all the ships that sail,  
Like me, before the merry gale,  
Until at last with them I came  
To some place with a foreign name

**"W**HY is Pussy in bed ?"  
"She is sick," says the fly,  
"And I fear she will die ;  
And that's why she's in bed."

"Pray what's her disorder ?"  
"A lock'd-jaw is come on,"  
Said the fine downy swan ;  
"And that's her disorder."

"Who makes her nice gruel ?"  
"That she might not get worse,  
Dog Tray is her nurse,  
And makes her nice gruel."

"Pray who is her doctor ?"  
"I," said famed Mister Punch,  
"At my back a great hunch ;  
But I am her doctor."

"Who thinks she'll recover ?"  
"I do, sir," said the deer,  
"And I thought so last year ;  
I think she'll recover."

And when Puss is quite well,  
All shall have noble fare ;  
Beasts, and fowls of the air,  
And we'll ring the great bell.



# OLD KING COLE



INTRO.

*f* Old King Cole was a mer-ry old soul, And a mer-ry old soul was

he; He call'd for his pipe, and he call'd for his bowl, And he call'd for his fidd-lers

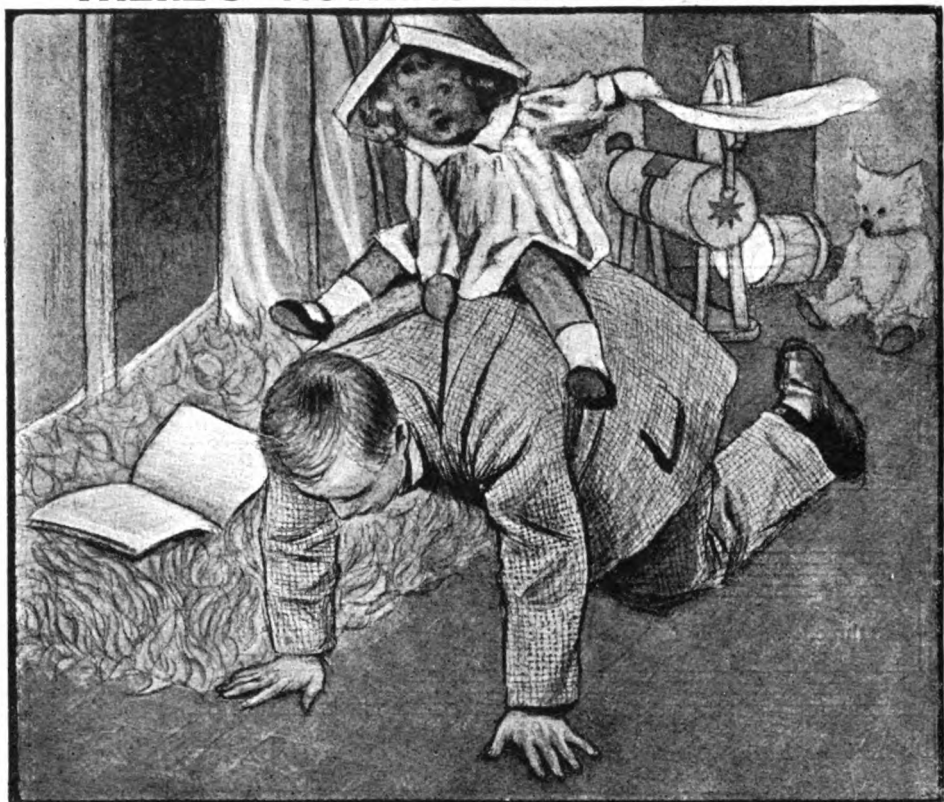
three. For ev-'ry fine fidd-ler had a fine fidd-le, And a

*ff* ve-ry fine fidd-le had he; So old King Cole was a

mer-ry old soul, And a mer-ry old soul was he; He

call'd for his pipe, and he call'd for his bowl, And he call'd for his fidd-lers three.

# THERE'S NOTHING LIKE A DADDIE



I do not want a puppy-dog, although I know they're nice,  
For my papa can romp with me in ways that quite suffice.  
He'll bark just like a St. Bernard, and like a mastiff growl,  
And you would feel like laughing when he imitates its howl.

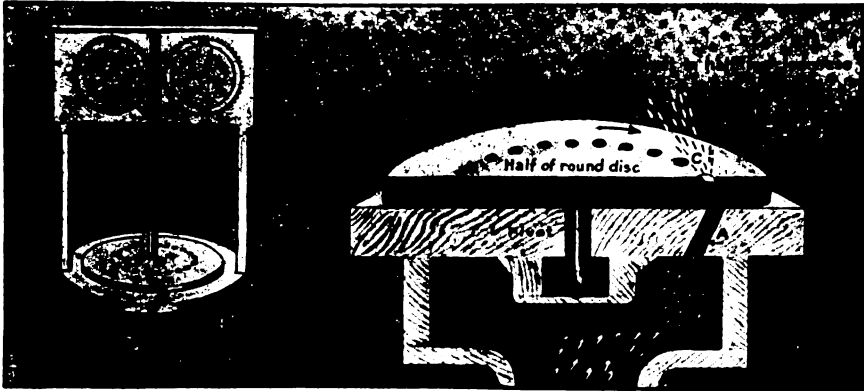


I do not want a pussy-cat. I like cats pretty well,  
But daddy beats them all, and plays better than I can tell.  
He'll purr and hiss like anything; his mewling you should hear;  
It makes more noise than any cat, and, oh, I shake with fear!

I do not want a pony small. Of course they're lots of fun,  
But what's the use of ponies when you're my dear daddy's son?  
He takes me on his shoulders broad, or puts me on his knees,  
And sets me off a-galloping as madly as you please.

In short, I don't want anything as long as daddy's here.  
He's pretty much of everything, and don't get out of gear.  
And best of all the things boys have, I'm sure you'll find it true,  
There's nothing like a daddy who will always play with you!





This picture explains how the siren works. As the disc revolves, the holes are brought in rapid succession over the tube A, and the puffs of air passing through these holes produce a loud sound. The dials record the turns of the disc, from which the number of puffs and sound waves can be calculated.

## WONDERFUL, WONDERFUL MUSIC

THE great art of music, though it is an art meant to be beautiful and to move us, is a strict science having perfectly definite laws based upon the facts of sound. The siren — about which we read on page 4760 — helps us in the study of what is called harmony.

The music of long ago consisted entirely of melody—that is to say, tunes which are usually very simple, but have only one note sounded at a time. We know, however, that it is very pleasant to the ear sometimes to hear two or more notes sounding at one time; we know, also, that sometimes it is very unpleasant. When the sound is pleasant, we call it a harmony; but when it is unpleasant, we call it a discord.

The greater part of the progress in modern music depends upon the progress in harmony, and all present-day lovers of music would be very sorry to have to be limited to melody alone, now that it is possible to add so much to it by means of harmony.

It is extremely interesting to discover, if possible, what makes harmony and what makes discord. The difference to our ears is very great, and there surely must be some rule that materially affects the nature

CONTINUED FROM 4760



of the sound, if only we could find out what that rule is. Again, it is very interesting to notice that there are certain kinds of harmony where the notes sounded together seem so much alike that we do not even speak of them as making a harmony. For instance, one C on the piano and the C above or below are certainly not the same note, yet they are so like each other that when they are sounded together it is very much the same as if we were listening to one of them, only the sound is rather richer and fuller.

Now, we might very easily suppose that our feeling that there is a sort of likeness or family resemblance between notes would depend on their being near to each other. Yet a C sounds very like another C, even, perhaps, two or three octaves away, and intensely unlike a note next to it, such as B or C sharp. This we soon notice if we sound two notes next to each other together. All ears are quite agreed about this, and there must be some explanation of it.

If we make a new kind of siren, as a German student has done, and use four sets of holes instead of one set, having a different number of



holes in each set, we have in this "many-voiced siren," as it is called, a very convenient way of studying harmony. The subject of harmony is one upon which many large books have been written.

It is really as much a science by itself as the study of the rocks or the study of the stars, and men who want to know all they can of it require to devote their whole lives to it. But everyone can understand the first great fact about harmony, and the difference between harmony and discord.

#### WHY TWO NOTES THAT ARE SEPARATED SOUND EXACTLY ALIKE

For instance, we can arrange the many-voiced siren in just such a way that it gives out two notes, one made of exactly twice as many puffs as the other. It does not matter at all how many the puffs actually are—that is to say, it does not matter whether the notes are high-pitched or low-pitched—so long as the one note is made of twice as many puffs as the other; the one will always be the octave of the other. They will sound like two C's next to each other on the piano. Now, these two C's are really separated by a large number of notes, and yet they sound more like each other, and form a closer harmony, than any two notes much nearer together. Our experiment has given us the key to this, and to the whole of harmony.

The great law is that the ear judges by relations, or, to use the proper word, *ratios*. When we compare any harmony with any discord, the difference is in the ratios, or relations, between the numbers of the notes. We know that every possible musical note means a definite number of air waves striking the ear in a single second of time.

#### THE IMPORTANT FACT UPON WHICH ALL MUSIC DEPENDS

It is upon the relations between those numbers that all harmony and, indeed, all music depend. The simplest possible relation between two numbers is plainly the relation of two to one. Nothing else could be quite so simple as that, unless the two numbers are actually the same. Now, our experiment with the many-voiced siren teaches us that this relation of two to one gives our ears the impression of the closest resemblance and harmony that are

possible. Two notes making an octave have this relation between them, and no matter whereabouts in the scale we take them, high or low or in the middle, they will always have the same effect upon the ear. One note may have 24 vibrations a second, and the other 48, or the numbers may be 25 and 50, or 15,001 and 30,002, yet, whatever the actual numbers are, the ratio of them is as one to two, and so to our ears the one sounds almost like the "double" of the other.

All modern music is based upon this fact, and, by filling in the interval between the one note and the other with a varying number of other notes chosen in a certain way, we form what is generally called a scale.

Nothing would be easier than for a player on the violin to play a scale or any number of scales which we should call simply hideous. On the other hand, there are certain scales which the ear likes very much. Some of them have the effect of being mournful, and some of being untroubled or even gay.

#### THE MUSICIAN'S A B C, THE SCALE OF NOTES UPON WHICH ALL MUSIC IS BUILT

Ever since music began, and in all parts of the world where it has existed, it has depended upon the use of a scale, or set of notes. For instance, one set of notes was used long ago in England and in Scotland, certain sets were used in Greece, and certain sets are used to-day in India and Japan.

In every case the particular set or sets of notes make up the material or alphabet of the musician. A clever musician can at once tell, when he hears a tune, like one of the beautiful old Scottish tunes, to what period it belongs and from what place it comes, because he recognises the scale from which the composer has chosen his notes.

Let us first look at the ordinary scale that we can play on the piano by simply touching the white notes from C to C. To our ears, accustomed from our earliest years to hear this scale, and to hear tunes made from it, this sounds natural, and any other scale at first sounds rather peculiar, and less natural. But every musical scale has its definite laws, always to be found by studying the vibration numbers of the notes that make it. To this we must add that the

numbers themselves are of no importance; the whole point is the relation between them. Any kind of scale may start on a note of any number, but all the other notes in the scale will have a fixed relation to that number, and those relations make the scale. We shall recognise it, and it will have the same effect upon our ears, whether it is played in a low key or a high one; it will really be the same scale, whether played by a bassoon or a flute or a violin. What it is that makes the difference in these cases we shall afterwards study.

#### THE RELATION BETWEEN THE DIFFERENT NOTES OF THE SCALE

It is quite easy to write down exactly the ratios of all the notes in the ordinary scale of C major, which most of us know so well. Let us suppose, just for the sake of the argument, that the lower C happens to have a vibration number of 24 per second; it might just as well be 25 or 250½ per second. But 24 is a convenient number, and, if it be 24, then we can find out exactly what all the other numbers will be. Here they are set out in order and showing their relation:

C	D	E	F	G	A	B	C
24	27	30	32	36	40	45	48

Now, there is no point in these numbers themselves, but there is all the point in the relation between them. The first thing we notice, of course, is that the ratio between the two notes that make the octave is the ratio of 24 to 48, and that is the ratio of 1 to 2. The next simplest ratio that we can notice is that of C to G, for C is 24 and G is 36, so that the ratio is that of 2 to 3. One more ratio we may note, and that is the ratio of C to E, which is that of 24 to 30, or 4 to 5. Now, if we take these notes that we have observed, C, E, G, C, we find, to begin with, that they make the common chord, the sound of which we all know so well, for most pieces of music end with it. If it comes in the middle of a piece of music, we are apt to think that we have reached the end.

#### THE COMMON CHORD THAT MOVES MEN ALL OVER THE WORLD

That is the peculiar quality of this wonderful chord; it sounds final. After other combinations of notes the ear expects more. But the ear is always content with this; it requires nothing to finish it or to carry it on. Now, in

the case we have chosen, the vibration numbers of these four notes are 24, 30, 36, and 48. If we reduce these, we see that the ratios are those of 4, 5, 6, and 8. Now, it does not matter where we hear a common chord, or what note it starts on, the ratios of the four notes making it are always those of 4, 5, 6, and 8.

This is really very wonderful. If we look at 4, 5, 6, and 8 on a piece of paper and study them, we are studying arithmetic, a simple branch of mathematics. As everyone knows, this science of numbers and figures is to many people the driest and most abstract in the world, yet its laws apply directly to some of the deepest and most wonderful feelings of which we are capable. Considered in themselves, the ratios 4, 5, 6, and 8 are quite dry; they seem to have nothing to do with mankind. Yet all over the world, in all ages, men have only to hear this ratio made in sound waves, and they always get a certain set of definite impressions.

First, the ratio means music as distinguished from noise; secondly, it means harmony as distinguished from discord; and, thirdly, it has the peculiar quality of saying, "This is the end," not merely pleasing the ear, but satisfying it.

#### THE WONDERFUL RELATION BETWEEN ARITHMETIC AND MUSIC

If we went farther into the matter, we should find that there are other ratios which always tell the ear that there is more to follow, and which make the ear positively long for what is to follow; yet the absolute difference between these two qualities depends upon abstract arithmetic — the difference between the ratio of one set of numbers and the ratio of another set of numbers.

These simple facts, so well known to all musicians and students of sound and of the ear, are full of the highest meaning if we have wisdom to see it. Anyone who had not thought wisely and deeply about the world would have supposed that no two things could be farther apart than, on the one hand, our feelings of yearning and satisfaction or sadness and joy, and, on the other hand, the arithmetical ratios between a certain set of numbers. Yet these two utterly different and unrelated things, as they seem to be, are eternally bound together by the laws of Nature and of man. Let us now print again the notes of the

scale and their vibration numbers in the case where we happened to start with 24, and underneath these let us print the ratios of these numbers :

C	D	E	F	G	A	B	C
24	27	30	32	36	40	45	48
1	$\frac{3}{2}$	$\frac{4}{3}$	$\frac{2}{3}$	$\frac{3}{2}$	$\frac{4}{3}$	$\frac{5}{4}$	2

We notice that these fractions vary in simplicity. The simplest is the fraction corresponding to G, and the next simplest is that of E, which is just half-way between C and G. These give us the common chord. It is very interesting to notice that one fraction in the above list is very decidedly less simple than any of the others—that is the fraction  $\frac{5}{4}$ , which corresponds to the note B in the scale of C.

Now, we are all quite able to sing a scale, and it is quite natural to us to strike the last note but one, which in this case is B. But when we have noticed that this ratio is really the least simple of them all, it is very interesting to learn from the history of music that this particular ratio had to be discovered.

#### THE NEW MUSICAL NOTES THAT WERE DISCOVERED IN RECENT TIMES

It appears that, to whatever part of the world we go, we find a time when the ears of musicians had not discovered this ratio as a way of getting from A to C. So they stopped at A. Very often, also, they had not discovered the ratio  $\frac{2}{3}$ , which corresponds to F. So it was that they had simply a scale made of five tones—C, D, E, G, A. This is the very famous five-tone, or *pentatonic*, scale, which we may say was the great scale of music until comparatively recent times, and the discovery of F, and more especially of the difficult ratio B, from which the scale can climb to a note exactly double of the note it started with, and so become beautifully finished.

There is no end to what might be learnt about the different kinds of scales, but what has been said gives us the key to the wonderful facts ; and we discover that music, this great art which, at its best, affects us so deeply and nobly, may really be looked upon as a branch of applied mathematics, an application of the laws of the ratios of numbers.

When we are playing a scale of any kind on the piano or on the violin, or when we are singing it, perhaps one of the notes we make sounds quite wrong,

and we say that it is out of tune. What does this mean ? There is nothing the matter with the note itself, remember, though, occurring where it does, it sounds so unpleasant that we are apt to think so. It may in itself be a lovely note, rich and clear, brilliant or tender. Nevertheless, where we hear it—perhaps in a scale or in the course of a song or a piece—it is simply dreadful.

#### WHAT HAPPENS WHEN THE PIANO IS OUT OF TUNE

The reason is that the vibration number of that note does not have the ratio it should have to the other notes. It is out of tune with them, or we might say that they are all out of tune with it. Anyhow, the ratio is wrong. If it is wrong because the vibration number is too small, we call the note flat ; if the vibration number is too high, we call the note sharp.

One of the commonest mistakes in singing and in playing the violin is to make the notes flat. No matter how beautiful the voice or the tone of the violin, no matter how expressively played, no matter how good the rhythm, how well judged the varieties of time or anything else, no one can forgive music that is out of tune. Everything else may be right, but if the arithmetic is wrong, the result is not music, but simply a miserable parody of it.

It is right to ask what is the meaning of the black notes on the piano, lying here and there between the white ones that make the scale of C. What has happened is that, in the course of the development of music, the first great stage in the development of a scale has yielded to a second. The first great stage was when the five-note scale was improved into the ordinary scale we know so well. We are quite right to say improved, because nothing was lost in the process. The five-note scale is still there, of course, included in the other.

#### HOW FIVE NEW NOTES WERE ADDED TO THE ORDINARY SCALE

The next great stage was to add five more notes at certain places in between pairs of the notes of the ordinary scale. If now we play all these notes in order on any instrument, we get exactly the same sound and result as when we play all the notes on the piano, one after the other, including the five new black notes with the older white ones.

The arrangement of this new scale is such that the distance between any two notes is much less than it is in the simpler scale. For instance, if we look at our table, at E, F, and G, we see that from E to F it is only half as wide a space as from F to G. Well, in the new scale with the black notes, a black note, which we call F sharp, has been put in between F and G, so that the intervals from E to F, from F to F sharp, and from F sharp to G are equal. The older scale, made by the white notes, is known as the *diatonic* scale, and the newer one with the black notes included is called the *chromatic* scale.

If now we compare the three scales, pentatonic, diatonic, and chromatic, we can understand something of the development of music. Not a very great amount of variety can be yielded by the oldest simple scale. This is not to say that the results may not be lovely, because they often were; only they were limited. It is this lack of variety that makes the difference between the diatonic scale and the chromatic scale.

#### THE KIND OF TUNES THAT CHILDREN LIKE AND UNDERSTAND

During the last hundred years or so, the chromatic scale has been used to a greater extent as the basis for composition. It is easy to understand that when children are learning music, the tunes they enjoy and understand first are based upon the simpler scales. Practically everyone enjoys these tunes, but it is only a comparatively small proportion of people who care for tunes built on the chromatic scale. Some people will say of a modern piece of music that there is no tune in it, but others, whose ears are better developed musically, know very well that there may be tunes in the newer music as well, only they are built upon a less simple scale.

If we chose to write all music down in the form of arithmetical ratios, which might be done, it could doubtless be shown how people can be classed according to the development of their musical ear by nature and education, beginning with those who can follow simple ratios like 2 to 1 and 3 to 2 and 5 to 4, and ending with those who can follow the more difficult ratios that are used so much in modern music. The siren is a kind of wind instrument, the music being made by puffing wind

or air through the holes. But everything that can be proved by the siren, and that is true of the siren and of all wind instruments, is equally true of string instruments. Sound waves happen to be produced in a different way in the two cases, but all the wonderful laws as to their ratios are the same.

#### THE SECRET OF THE FIDDLE AND ITS STRINGS

String instruments are so valuable in music, and the behaviour of stretched strings is, in any case, so interesting that it has been very carefully studied. If we look at a violin and notice how it is used, we shall see that there are three facts about a string which decide the rate at which it vibrates.

To begin with, we notice that the strings which make the lower notes are thicker than those which make the higher. This is because of the law that the rate of vibrations of a heavy string is less than that of a light string. The heaviness, or, rather, the mass, of a string will depend partly upon the density of the material and partly upon the thickness of it. Secondly, we notice that it makes a difference to the violinist how tight his strings are.

When he tunes his instrument, he is turning the pegs which decide how tight the strings shall be. The tighter the string, the more quickly it vibrates, and the higher the note becomes. If we increase the tightness by 4, the string vibrates twice as often; if by 9, it vibrates 3 times as often—4 being 2 multiplied by itself and 9 being 3 multiplied by itself. That is the law for all cases.

Lastly, we notice that when the violinist plays, he is constantly moving the fingers of his left hand and pressing upon the strings. This is simply the most convenient way of altering their length, because when he presses upon or stops a string at any point, it is just as if the string stopped there altogether.

#### THE NOTE THAT IS DIFFERENT ON DIFFERENT INSTRUMENTS

We also notice that when he is playing high notes his fingers come farther and farther down, so as to make the strings shorter and shorter. The shorter the string the higher the note.

There is a deeply interesting question which we have not yet discussed at all. Let us suppose that the C of the piano is 24, as we did before. Now, we may

have an organ and a violin and a voice, and many other kinds of instruments, all sounding this same note, and yet the sounds are very different. Everyone would instantly know which was the note made by the violin and which was the note made by the piano.

#### THE MUSIC OF THE SIMPLE WAVES AND THE MUSIC OF THE MIXED WAVES

Clever people, too, can tell one piano from another, and it is often easy to tell one violin from another, and we can all tell the voice of one friend from that of another; that is true even though it is the same note that is being sounded in all these cases, and it is very interesting for us to discover where the difference lies.

To begin with, there are some kinds of musical instruments where the differences are not to be found. Tuning-forks, for instance, professing to sound the same note, really do sound the same note—without the difference that there is between a cheap violin and a good one. On careful study we find the reason for this difference. In the case of a tuning-fork, the sound waves are perfectly simple; but in the case of a violin or a voice or a piano or an organ-pipe, it is rather as if the waves were like big billows of the sea with little ripples on them, and with perhaps tinier ripples on these ripples, if our eyes could see them.

Now, it makes a very great difference to our ears whether sound waves are simple, like a line simply waving plainly up and down, or complicated, with all sorts of smaller waves mixed up with the main wave. All the sounds that are valued in music are made up of these mixed waves. The main wave is called the fundamental note or tone, and all the other smaller waves which go with it are called over-tones or harmonics.

#### WHY DIFFERENT INSTRUMENTS MAKE DIFFERENT SOUNDS

These over-tones are equally interesting to the student of sound and to the student of music. It is the quality, the number, and the relative loudness of the over-tones that make the difference between one instrument and another, and one voice and another, even though they are all sounding the same fundamental note. This means that nearly all the musical notes we hear are really not single notes so much as combinations of notes. They are really harmonies,

only we scarcely notice them as such because the lowest note of the chord is so very much louder than all the others; yet they are, and they make all the difference between the sound of the violin or of the piano, the voice of one friend and that of another.

The great interest of music written for various instruments and for various kinds of voices consists in the endless variety that we are able to get by using one instrument with another kind of instrument which has different over-tones. Whatever the instrument employed, we desire that its over-tones shall be many and rich and harmonious. This is most notably true in the case of the violin and the human voice.

We all know that some violins, made many years ago, are worth thousands of dollars, while others may be worth as many cents or less, because, no matter whether we have the same player, the same bow, and the same strings in the two cases, the one violin will make a rich, lovely musical tone, and the other a thin, scratchy noise which would scarcely be called music by anyone.

#### THE SECRET OF THE WONDERFUL FIDDLES OF OLDEN DAYS

All this is wholly a question of over-tones. Somehow or other, one and the same string, played by the same bow, by the same hand, in the same room, produces lovely tones or ugly tones in the two cases, though the name of the note is the same.

There is something, then, about the body of the violin which makes all the difference, and this is now understood. The string is making not only the big main wave itself, but also the little waves. The secret of making the sound lovely is to have near the string something which can be made to vibrate when the string does, and it must be something which has the power of picking out from the string-waves just those over-tones which the ear likes best; then the tone will be enriched. In the wonderful violins of old days, the front and the back of the body seem to be made of exactly such size and shape and curvature and thickness that they both resonate in just the same way and to just the same notes. They help each other instead of fighting against each other, and that is their secret.

The next part of this is on page 4913.

## THE STORIES OF JULES VERNE

**JULES VERNE**, the famous French writer of imaginative tales, was born at Nantes on February 8, 1828, and died at Amiens on March 24, 1905. He wrote a large number of stories in which he made use of existing inventions by imagining how they might be developed to alter the course of life. We are to read two of these here, the first of which involves no extraordinary inventions. The hero is an Englishman; but the author makes many comic errors, for the fact that he could make an Englishman mistake a Saturday in London for a Sunday is sufficient to show how little he knew of English life. It is now possible to make the tour of the world in half the time that Phileas Fogg took, so vastly has the speed of railway and steamship travelling increased since the story was written, in 1873. There is a brisk and sustained movement throughout the narrative which makes up for much that is crude and improbable.

## ROUND THE WORLD IN 80 DAYS

IN the year 1872, the house at No. 7, Savile Row, London, was inhabited by Phileas Fogg, an eccentric member of the Reform Club of London. Although unmistakably an Englishman, he may not have been a Londoner, but it was certainly many years since he had been absent for any time from the daily routine of his life in London. He lived quite alone, and never had a visitor. A single servant attended to all his domestic wants. And as he required of this servant a degree of punctuality and regularity almost beyond an ordinary human being, he had some difficulty in keeping even one servant.

It was October 2, and Mr. Fogg had just discharged his servant because he had brought him his shaving water heated to 84° fahr. instead of 86°. He now awaited the appearance of his new servant, who was due between eleven and half-past eleven. At that moment the discharged servant ushered his successor into his master's room. His name was Jean Passepartout, and he was a stout Frenchman of some thirty years.

"You have been recommended to me," said Phileas Fogg, "and I have some good testimonials concerning you. You know my conditions?"

"Yes, sir."

"Good. What is the time by your watch?" Phileas Fogg continued.

"Eleven twenty-two," replied Passepartout, drawing from the depths



of his watch-pocket an enormous silver watch.

"You are slow," said

Mr. Fogg.

"I beg your pardon, sir, but that is scarcely possible."

"You are four minutes slow," continued Mr. Fogg; "but it does

not matter so long as you know it. And now, from this moment, eleven twenty-nine a.m., Wednesday, October 2, 1872, you are in my service."

So saying, Phileas Fogg rose up. Taking his hat in his left hand, he placed it on his head with a curious automatic movement, and left the house without another word. After he had placed 575 times his right foot before his left, and 576 times his left foot before his right, he arrived at the splendid building of the Reform Club. In the dining-room there he took his regular place at his regular table, where his regular lunch was ready for him. At 12.47 he rose and went into the reading-room, where one of the waiters gave him a copy of "The Times" newspaper, the reading of which occupied him until 3.45, when he took up "The Standard," and read that until dinner. At 5.40 he was back again in the reading-room, engrossed in "The Morning Chronicle." Half an hour later he was joined by several members of the club who were his particular friends and his regular partners in a game of cards that they played every evening.

"By the way," said one of these — Flanagan, a rich brewer — "what's



the latest about the robbery?" addressing Mr. Ralph, a director of the Bank of England.

"The Bank will lose its money, I fancy," remarked Mr. Andrew Stuart, the famous engineer.

"On the contrary," replied Mr. Ralph, "I hope we shall soon lay hands on the thief; and as all the ports are being carefully watched, he will find it difficult to escape from the country."

#### A GREAT BANK ROBBERY, AND THE ESCAPE OF THE ROBBER

"The Morning Chronicle" considers that the person who has taken the £55,000 in banknotes is no ordinary bank-robber, but will be found to be a man of some position."

With this observation, Phileas Fogg emerged from the folds of "The Morning Chronicle," and was greeted by his friends. The conversation concerning the bank robbery was continued, and many theories were discussed as to how the thief might make good his flight.

While some of the gentlemen considered the world was so large that one could easily get beyond the reach of the law, Phileas Fogg maintained, in his quiet way, that the world was no longer large, and the bank director agreed in thinking that the means of transit had made the world a much smaller place to live in. Thus it was that they came to discuss, as they played at cards, how long it would take to go round the earth.

Three months was held to be the time required, but Phileas Fogg maintained that eighty days would be sufficient. Stuart, the engineer, offered to wager \$20,000 that it was impossible. Phileas Fogg asserted that he was ready to start at once, and prove that he was right—that very night, in fact.

#### MR. PHILEAS FOGG MAKES A WAGER OF \$100,000 IN STRANGE CIRCUMSTANCES

To show his confidence, he said he would risk \$100,000 of his fortune on the venture, staking that sum against anyone who cared to accept the wager, and agreeing to pay it over if he did not make the tour of the earth in eighty days or less. His five fellow-clubmen accepted the wager, and Mr. Fogg warned them that he would make the tour at their expense.

"Now that's settled," said Mr. Fogg. "I find that a train leaves for Dover at 8.45 to-night; I shall travel by it."

"This very evening?" exclaimed Stuart, in a tone of great surprise.

"This very evening," replied Fogg, as coolly as though it were a matter of going to the next street. Consulting his pocket calendar, he continued: "As this is Wednesday, October 2, I ought to be back in the reading-room of the Reform Club on Saturday, December 21, at 8.45 p.m., in default of which the £20,000 now lying at my bankers' will belong to you gentlemen."

Seven o'clock struck as he was speaking, and his friends offered to stop the game so that he might make his preparations for departure, but this he declared unnecessary, as he was always ready, and he continued playing till 7.25, when he said good-bye to his friends and left the club. Twenty-five minutes later he opened the door of his house and found Passepartout awaiting him.

"We have to leave in ten minutes for Dover and Calais," he said, "as we are to go round the world in eighty days, so there's not a moment to lose."

#### THE SURPRISE OF PASSEPARTOUT, AND HOW THE GREAT TOUR BEGAN

The calmness with which he imparted this information to his new servant left that worthy Frenchman almost breathless with amazement. He suggested some of the usual preparations for travel, but his master dismissed them all by saying that they would take no luggage beyond night-clothes, a shirt or two, and three pairs of socks. Anything else would be bought on the way.

By 8 o'clock Passepartout had made this simple preparation, and after carefully shutting up the various rooms he found his master ready. Into the travelling-bag Mr. Fogg thrust an enormous bundle of banknotes, telling his servant to be careful of the bag, as it contained no less than \$100,000. Thus they left the house, Passepartout carrying the bag and his master's waterproof and travelling-rug. The front door was double locked, and crossing to the cab-rank they hired a cab and drove rapidly to Charing Cross Station. At the station the five friends of Phileas Fogg were present to see him off, and he explained to them that he had a passport which he would get witnessed at every important place on his route as evidence of his journey. At 8.45 the

train steamed out of the station ; the journey round the world had begun.

Seven days later, while people were waiting at Suez for the arrival of the mail steamer Mongolia, two men on the quay were in earnest conversation. The one was the British consul, and the other a thin little fellow, with an intelligent but somewhat restless face, whose eyes seemed never at rest. This man was Fix, one of the many detectives sent out to the chief ports to track the author of the bank robbery, the discussion of which had led in so singular a way to Phileas Fogg's tour of the world.

This Fix had a notion that the robber might have chosen a new way to make for America, instead of taking any of the western routes, and might, travelling eastward by way of India and Japan, get to America by the least likely route.

**MR. FOGG IS SUSPECTED, AND FIX, THE DETECTIVE, BEGINS A LONG CHASE**

The Mongolia was only to stop for a short time at Suez and continue her voyage direct to Bombay. As the passengers came off they were all carefully watched by the detective, and Passepartout, having been sent ashore with Mr. Fogg's passport to have it witnessed, raised his suspicions. It was necessary for Mr. Fogg to present the passport himself if he wanted the consul to witness it, and thus Mr. Fogg had himself to come ashore for the purpose.

The consul pointed out that there was no need whatever for a passport, but Mr. Fogg explained that he desired to have it witnessed wherever he went. Now firmly believing that he was on the track of the bank-robber, for whose arrest a substantial reward had been offered, Fix decided he would follow Mr. Fogg to Bombay, and immediately took passage in the Mongolia.

On the way to Bombay, Fix endeavoured to secure as much information as possible about this Phileas Fogg from his servant, and, Passepartout being of a frank and jovial nature, the detective had little difficulty in getting to know the truth. But this truth he naturally mistook for a lie, and supposed that the pretended tour round the world was merely to throw detectives off the scent. He hoped that the warrant for the arrest of the robber would arrive soon after they got to Bombay, and

he would put an immediate end to the travels of Mr. Phileas Fogg. But it so happened that the Mongolia made a much quicker passage than usual, and, reaching Bombay on October 20, was two days ahead of her time. The order of arrest had not arrived, of course, but Fix determined not to lose sight of the mysterious scoundrel who was now almost within his grasp.

**PASSEPARTOUT HAS A STRANGE ADVENTURE IN BOMBAY**

Mr. Fogg and his servant had only been an hour or two in Bombay when Passepartout involved himself and his master in serious trouble. Sent to make some purchases, he wandered into one of the great Hindu temples without having first taken off his boots, and on being turned out by the priests, who forcibly removed his boots, he had dealt very roughly with them before he took to his heels, followed by an angry crowd. He only got to the station a few minutes before the train was due to leave. His master was awaiting him, and as Passepartout explained breathlessly the cause of his delay he was overheard by Fix, who had determined to keep Fogg in close observation by travelling with him in the same train to Calcutta.

Passepartout occupied the same compartment as his master, but there was a third traveller in the opposite corner. This was Sir Francis Cromarty, a brigadier-general, who had travelled with Mr. Fogg from Suez to Bombay, and was now on his way to take up his military command at Benares.

**MR. FOGG PAYS \$10,000 FOR AN ELEPHANT, TO CONTINUE HIS JOURNEY**

The officer became friendly with Mr. Fogg and also with Passepartout, whose great silver watch he found was still regulated according to Greenwich time. Sir Francis endeavoured to explain to Passepartout that as they were progressing steadily toward the east the days were shorter, and each degree that was passed made a difference of four minutes, so that when a new meridian had been reached it was necessary to regulate his watch, as the Greenwich time was based upon the meridian of Greenwich. But all this advice was lost on the worthy Passepartout, who continued to keep his old turnip of a watch true to Greenwich time.

Early on the morning of October 22, they had arrived at the end of the railway, with a matter of fifty miles to Allahabad still to be completed, although the completion of the railway to that town had been announced. Phileas Fogg was determined not a moment should be lost in continuing his journey, and the only means that seemed possible was to hire an elephant.

Even this was not easy, as the only Indian at Kholby, the village at which they had arrived, who had an elephant had no wish to part with it. Not even an offer of a thousand pounds moved him, and only when Mr. Fogg offered the enormous sum of \$10,000 would the Indian sell the animal. Passepartout was aghast at such a price being paid for an elephant, and Sir Francis Cromarty no less. But without delay the animal was got ready for the journey, and a young Parsee offered himself, and was engaged as driver.

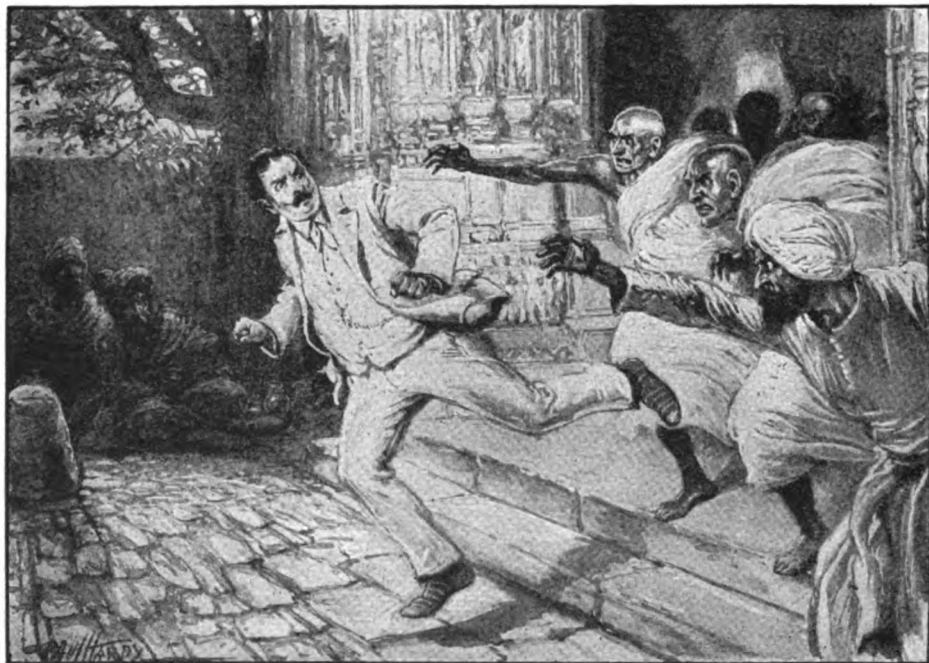
They had arrived at eight, and at nine o'clock they set out on the back of the elephant, taking the road which led through a beautiful forest of palms. By eight o'clock at night they had gone half-way to Allahabad. Setting off again at six o'clock next morning, the guide hoped to arrive in Allahabad that

evening, and would no doubt have been as good as his word, but about four o'clock, as they were threading their way through a thick forest, they happened to espy a strange religious procession, conveying a dead rajah to a forest-temple. There were many priests in the procession, which was accompanied by weird music, and a young woman, almost as white as a European, was being dragged by them, clearly against her will.

"A suttee!" whispered Sir Francis to Mr. Fogg, who did not seem to understand what he meant. "A suttee," he continued, "is a human sacrifice; but the victim is supposed to be voluntary. This young woman, no doubt the widow of the dead rajah, will be burnt alive early to-morrow morning."

"At sunrise," said the guide; "but hers is not a voluntary sacrifice, as everybody round about here is aware."

Phileas Fogg was greatly impressed with what they had seen, and seemed troubled in thought after the procession had disappeared and the guide had resumed the journey. "I am still twelve hours to the good, and I would willingly give these hours to save the young woman," he said quietly. The guide was able to give more



PASSEPARTOUT WAS DRIVEN FROM THE TEMPLE WITHOUT HIS BOOTS



PASSEPARTOUT RESCUES THE RAJAH'S WIDOW FROM BEING BURNED ALIVE

information about the intended victim, who was the daughter of a rich Bombay merchant, and had received an education which would have made it difficult to tell her from a European. Her name was Aouda. She had been married only three months to the rajah, and, knowing well what would be her fate if he died, she had endeavoured to escape, but had been recaptured. All this made Mr. Fogg the more determined to save her if he could, and he directed the guide to take them towards the temple, so that when the night fell they might carry out some means of escape for the poor woman.

When they came within sight of the temple the ceremonies were still going on, and when the procession went away guards with flaming torches remained, to keep watch over the victim. How to affect a rescue was indeed a puzzle, and Mr. Fogg and his friends had waited until midnight without being able to decide upon a plan of action. Passepartout, however, determined to try a little plan of his own, and slipped away without a word to his companions.

The hours of darkness slowly dragged out, and it was clearly impossible to force an entry into the temple. Then the thinning shadows announced the

approach of dawn. The hour of sacrifice was at hand. Presently the temple doors were opened, and the victim was brought forth by two priests, while a great crowd of fakirs and other mourners had now assembled, and made loud noises as they followed Aouda and the priests. Fogg and his companions mixed with the tail-end of the crowd, and in a few minutes they had arrived by the river-side, where, on a funeral pyre, lay the body of the rajah.

In the semi-light of the early dawn they could see the almost lifeless body of the young victim lying beside the body of her dead husband. Then a torch was applied to the pile, and the wood, steeped with oil, began to burn. Suddenly a cry of terror arose, and all the crowd of people threw themselves to earth, horror-stricken. The old rajah was not dead, but had suddenly come to life again, and, raising the young woman in his arms, descended from the funeral pyre amid the wreathing smoke, which gave to him a strange spectral appearance.

The priests and the people, amazed at such a prodigy, dared not raise their eyes from the ground, and the figure of the rajah, firmly grasping the unresisting form of the young woman,

marched clear through the crowd to where Mr. Fogg and Sir Francis Cromarty stood. "Let's get on," it said. For it was Passepartout himself, who had profited by the smoke of the funeral pyre to steal into the thick of it and rescue the intended victim from the flames which were now bursting forth!

**THE ESCAPE INTO THE FOREST AFTER THE RESCUE OF Aouda**

An instant afterwards and all four had disappeared into the forest, being carried forward at a steady trot by the elephant. Not a moment was to be lost, as they had gone but a little way when they heard cries which indicated that the ruse had been discovered, and a gun-shot pierced the hat of Phileas Fogg. But success attended them, for the guide knew all the secrets of the forest, and forced the elephant to the height of its pace, so that by ten o'clock they were at Allahabad, where the railway journey was resumed to Calcutta.

Mr. Fogg, in paying the guide, gave him the exact sum agreed upon, which astonished Passepartout, as his master had shown himself so generous. But as Mr. Fogg had no further use for the elephant, he presented that to the faithful Parsee, who protested that it was a fortune he was offering him. "Accept it, and it is I who will be your debtor," was all that Mr. Fogg would say.

A few minutes afterwards he and his companions, together with Aouda, who was given the best place, were snugly installed in the railway carriage, proceeding at all speed to Benares, where Sir Francis took leave of Mr. Fogg and wished him all success. By seven o'clock in the morning Calcutta had been reached, and as the mail-boat for Hong Kong would not weigh anchor till noon, Mr. Fogg had still five hours before him.

**THE ARREST AT CALCUTTA, AND HOW THE TRAVELLERS GOT AWAY**

But just as Mr. Fogg was about to quit the station, he was met by a policeman, who asked him if he was Mr. Phileas Fogg, and the man with him his servant. "Yes," said Mr. Fogg. The policeman then requested both of them to follow him, and said Aouda might accompany them.

They were conducted to a carriage, and in twenty minutes, during which none of them spoke, they were driven

to a court-house of the district, and were soon brought before a magistrate.

Very soon the reason for this unexpected interruption was apparent, when Passepartout stood charged with behaving in a disorderly manner in the temple at Bombay. His master was also involved in the charge, and the detective Fix was congratulating himself on his ingenuity in having reported the matter to Calcutta and secured the arrest of Fogg and Passepartout, as he hoped thus to detain them until the arrival of the order of arrest from England. But that ingenious officer had not been prepared for Mr. Fogg undertaking to pay any possible sum that might be named as bail, certainly not \$5,000 each!

This Mr. Fogg did cheerfully, to the wonder of not a few; and Passepartout's boots, brought from Bombay as the strongest evidence against him, were returned to their owner, who considered they had become the most expensive pair of boots in all the world.

**OFF TO HONG KONG, WITH FIX, THE DETECTIVE, IN PURSUIT**

Mr. Fogg and his companions left the court-house and drove straight for the quay, followed closely by the detective. There in the harbour lay the steamship Rangoon, with steam up and the Blue Peter floating from the masthead. Mr. Fogg hailed a small boat, and was rowed towards the steamship in the company of Aouda and Passepartout. This was too much for the detective, who stamped his feet in anger.

"The rascal!" he exclaimed. "He is going off at a sacrifice of \$10,000! Only a robber could be so free with his money. Ah, but I'll follow him to the end of the world, if necessary! Only, if he goes on like this, all the stolen money will be spent by then!"

Fix had therefore to join the Rangoon without waiting until the order of arrest had arrived, and he had to be very careful not to excite suspicion in the minds of those whom he was tracking, so that he pretended it was an extraordinary coincidence to meet them again. In the course of the journey he managed to draw from Passepartout the story of Aouda and how she came to be one of their travelling-companions. This was, the detective thought, important news to him, as he hoped he might use it to

get the restless travellers stopped at Hong Kong, in which port Mr. Fogg meant to restore Aouda to one of her relatives, a rich merchant of that town.

**WHAT HAPPENED AT HONG KONG, AND HOW MR. FOGG MISSED THE MAIL-BOAT**

The latter part of the voyage to Hong Kong was marked by rough weather, and the Rangoon arrived there a day late, making the port on November 6 instead of November 5. It was Mr. Fogg's intention to take passage immediately in the steamship, the Carnatic, which was due to sail on the fifth, but, having to effect some repairs to its boilers, had been delayed until the seventh. Thus, by good luck, as it seemed, Mr. Fogg had no less than sixteen hours ashore, in which he could make inquiries about Aouda's relatives. The result of these inquiries was the discovery that the rich merchant had left Hong Kong and settled in Europe, so that, clearly, Aouda would have to continue in the company of her rescuers for a long way yet.

Passepartout was despatched to engage three cabins in the Carnatic, and on the way fell in with the detective, who felt that the time had come for desperate methods when he heard that Mr. Fogg was to sail with the Carnatic early next morning. In the meantime, however, repairs having been made to the steamship's boilers, it had been decided that she would sail that night instead of next morning. This made the situation still more desperate.

**PASSEPARTOUT'S VISIT TO AN OPIUM DEN, AND THE CONSEQUENCES**

Fix contrived to entice Passepartout into an opium den. He first tested the Frenchman's loyalty to his master by assuring him that the story of the wager was only Fogg's pretext for getting away with the stolen money, and he offered to share his reward with Passepartout if he would help him to get his master arrested. But the servant indignantly refused. He had not acted wisely in everything, but he was at least loyal to his master. Unhappily, he allowed the detective to entice him into smoking a pipe of opium, and that was why the Carnatic sailed that night without certain passengers for whom cabins had been booked. Mr. Fogg was deeply annoyed, on arriving at the quay in the morning, to

discover that the vessel had gone; and there he met the detective, whose heart bounded with delight as he informed Mr. Fogg that the next boat sailed in eight days. With Fogg delayed eight days at Hong Kong, there would be time to receive the order of arrest which was now on its way! But Phileas Fogg was not content to accept the situation as it stood, and he went from pilot to pilot, making inquiries as to the possibility of hiring some vessel which would land him at Yokohama by the fourteenth, in time to catch the mail steamer for San Francisco.

At first it seemed a hopeless quest. Many laughed at him for his pains; but at length he discovered that the mail steamer really started from Shanghai, calling later at Yokohama. Shanghai is 800 miles from Hong Kong, and they had four days to cover the distance. This the master of the brigantine Tankadere, John Bunsby, believed he could accomplish if the sea held calm.

**MR. FOGG'S DESPERATE VOYAGE, AND HOW HE CAUGHT THE STEAMER**

Mr. Fogg, promising him \$500 per day and a prize of \$1,000 extra if he got there in time, engaged the Tankadere, on which, within an hour, he set sail with Aouda, Passepartout having mysteriously disappeared. He also invited Fix to go with him, as that person said he, too, was anxious to get to Yokohama.

The voyage of the vessel was a most adventurous one, as the heaviest of seas were encountered, and the hope of catching the mail steamer before it sailed had fallen to vanishing-point. But throughout all the trials and disappointments of the hazardous journey, Mr. Fogg remained as calm as on his walks to the Reform Club, and none would have imagined that his fortune was at stake. They were no more than three miles from Shanghai when they made out a long feather of smoke in the distance, which betokened the departure of the American steamer, and Bunsby saw it with despair. But Mr. Fogg merely ordered him to fire a signal of distress and show the flag at half-mast, in the hope that the liner might change her course and make for them.

Meanwhile, we have to know that when the Carnatic sailed on the evening of the seventh from Hong Kong, it



carried one of the three passengers who had hoped to join it. For poor Passepartout, overcome by the opium and left by the detective, kept repeating "The Carnatic, the Carnatic!" as the effect of the drug began to pass away.

#### HOW PASSEPARTOUT BECAME A CIRCUS PERFORMER IN JAPAN

And this fixed idea had enabled him, while still half fuddled, to make his way from the opium den and tumble on board just as the vessel was about to sail. But we can imagine his dismay when he came to his senses next day, and discovered how foolishly he had acted. On November 13 he found himself at Yokohama, and, having no money left, he was reduced to join a troupe of ridiculous circus performers known as the "Long Noses," because they all wore enormous noses, several feet in length, when going through their acrobatic antics. As the troupe was about to go to America, Passepartout thought that this was a good plan for getting his passage thither, now he had lost his master. His brawny form made him just the man for the base of the "human pyramid," which was the great attraction of the performance of the "Long Noses." He was fulfilling that responsible position one day when he suddenly seemed to forget his work, and let the other members of the "human pyramid" tumble to the ground, while he ran forward and threw himself at the feet of one of the spectators, crying: "My master, my master!"

"You?" said Phileas Fogg. "Very well, then, let's get off to the steamer."

But Mr. Fogg had to part with a good handful of banknotes to the manager of the circus before that person let the latest of his "Long Noses" depart. And Passepartout, in the excitement of finding his master again, went all the way to the boat without taking off the ridiculous nose that he was wearing.

#### MR. FOGG ARRIVES AT YOKOHAMA AND FINDS HIS SERVANT

Thus we see that Mr. Fogg's signal of distress had been successful, as he, with Aouda and Fix, had been taken on board the American steamer, General Grant, after paying the master of the Tankadere the full sum agreed upon, and the prize as well. He had arrived at Yokohama, there to discover that

Passepartout had actually been carried by the Carnatic to that port, and an hour or two later he found his servant in the circumstances just described.

On the American steamer they set out for San Francisco, and nine days after they had left Yokohama, Phileas Fogg had covered exactly one-half of the journey round the world. In other words, on November 23 the steamer had passed the hundred and eightieth meridian. Now, where was the detective? He was actually on board the General Grant, keeping in his cabin to avoid meeting Passepartout as long as possible.

#### FIX, THE DETECTIVE, RECEIVES THE ORDER OF ARREST TOO LATE

At Yokohama he had discovered that the British consul had just received the order of arrest which Fix had missed at every other stopping-place on Mr. Fogg's journey; but as Mr. Fogg had now left British territory it was useless! The detective's desire was now to hasten Mr. Fogg's journey back to England, so that he could arrest him the moment he arrived there; he had no longer any wish to delay him, as both their interests were the same so far as the return to England was concerned. When Fix did encounter Passepartout on deck, the latter gave him a good thrashing, which the detective took as if he deserved it, and then explained why he no longer wished to delay Mr. Fogg.

On December 3 the steamer passed through the Golden Gate, and arrived at San Francisco. While walking in the town that day, Mr. Fogg, "by the most remarkable chance," met the detective, who had kept out of his sight during the voyage. "Business" had recalled him to Europe, so he explained how delighted he would be to travel thither in the company of Mr. Fogg. Meanwhile, Passepartout had been buying some revolvers, as the railway journey across America in those days was not without danger; and at six o'clock that night the train steamed out of San Francisco with Mr. Fogg and his companions as passengers.

In three days and three nights they had covered a matter of 382 miles. Four more days and four more nights should have taken them to New York; but the trouble, for which Passepartout had prepared, came, as the train was

## THE STEAMSHIP THAT CONSUMED ITSELF



When nearly eight hundred miles from England's shore the coal supply gave out, so Mr. Fogg bought the vessel for \$60,000, and ordered the crew to cut down the masts and all the woodwork to feed the steamer's furnaces.

attacked by a band of Sioux Indians, who endeavoured to stop it, after disabling the engineer, but, of course, did not know which of the handles to work.

**PASSEPARTOUT SAVES HIS FRIENDS FROM INDIANS, AND IS CAPTURED HIMSELF**

Thanks to Passepartout, the passengers were saved by his managing to crawl along the bottom of a carriage and disconnect the engine from the train, so that while the engine went on alone, the carriages slowed down at Fort Kearney station, where the Indians made off, afraid to meet the soldiers stationed there.

It was found, however, that Passepartout and two others had been taken prisoners by the Indians; and, of course, Mr. Fogg would not continue his journey until his servant's fate was assured. A company of soldiers were sent in pursuit of the Indians, and next day they returned with Passepartout and the other two, whom they had recovered alive from the Sioux. But, meanwhile, the train had been made up again, and had continued on its way to New York. The next train would not leave until that evening. This meant a serious delay, as Mr. Fogg had to catch the steamer for Liverpool at New York at nine o'clock on the evening of the eleventh. As the ground was covered with snow, and a strong wind was rising, there remained the possibility of making good speed in an ice-boat!

**A SURPRISING JOURNEY OVERLAND IN AN AMERICAN ICE-BOAT**

So, in a large sledge furnished with strong sails, the party set out to cover the 200 miles between Kearney and Omaha, where the railway to Chicago could be joined. The run of the ice-boat was an entire success, and at Chicago there was no lack of trains for New York. But, alas, Mr. Fogg was three-quarters of an hour late in New York, and the Liverpool steamer had gone!

There was nothing for it but to hire a boat, and this was no easy matter. Not until he had offered the captain of a steamer \$8,000 to take himself and his three companions to Bordeaux, where the steamer was bound, could he get away from New York. But, of course, he did not wish to go to Bordeaux, and when they had been

at sea some days Mr. Fogg had to take the extreme measure of bribing every member of the crew, then imprisoning the captain, and assuming command himself, for it now appeared that he was a practised navigator.

They had got to within 770 miles of Liverpool when the coal entirely gave out, and Mr. Fogg then brought the captain to reason by the simple process of buying the vessel from him at \$60,000, which was much above its value. He then gave orders to burn the masts, and so they went along, tearing up all the woodwork to feed the furnaces, until, when they arrived at Queenstown, the vessel was only a fragment of what it had been. But Mr. Fogg presented it to the captain, and left him on friendly terms.

**MR. FOGG ARRESTED AT LAST, AND WHY HE THOUGHT HE HAD LOST HIS WAGER**

Train to Dublin, and steamer to Liverpool, left him only six hours to do the journey from the Mersey port to London. It would have been sufficient; but, as he stepped on the quay at Liverpool, Fix, the detective, laid his hand on his shoulder, and, showing the order of arrest, said:

"I arrest you in the Queen's name!"

So off to prison was Mr. Fogg hurried, and he had been two hours there before Passepartout and Aouda arrived in company of Fix, the latter out of breath and his hair wildly disordered, to announce that it was all a mistake, as the real bank-robber had been arrested! Mr. Fogg said not a word, but, with automatic precision, lifted his hand and struck the stupid detective to the ground. He walked away with Aouda and Passepartout, hired a carriage to the station, commanded a special train to London, and arrived there as the fingers of the station clock showed ten minutes to nine. He was five minutes late, and had lost his wager!

Not only had poor Phileas Fogg lost his wager, but he had wasted his fortune, and Aouda sought to console him in his dejected frame of mind. She had really come to love the strange, quiet man, who, on every occasion on which he was tested, had shown the kindest of hearts. And he himself was in love with her, though he would never have avowed it. It was therefore left to Aouda to propose

that if he were now to be a poor man he required someone to comfort him, and as he had been the means of saving her life, and had perhaps for that reason lost his wager, she should be his comforter. Mr. Fogg felt that this would be a most desirable arrangement, and would compensate him for his disappointment. So next day Passepartout was despatched to interview the parish clergyman of Marylebone and make arrangements for the marriage. When he returned he was breathless with excitement, for the clergyman had said it was impossible to arrange anything, to-morrow being Sunday.

"To-day Saturday! Impossible!" exclaimed Mr. Fogg. "To-day is Sunday, and to-morrow Monday!"

"But no," persisted Passepartout;

He had won his wager of £20,000, and his friends were waiting for him, as they had arranged eighty days before.

And how was it possible for so exact a man to make a mistake of twenty-four hours in his calculations? Simply because he had not allowed for the time gained on a journey made continually eastward, though Sir Francis Cromarty had pointed this out to Passepartout. In going round the world towards the east a day is gained, and in going round towards the west a day is lost. Phileas Fogg, travelling always eastward, should have retarded his watch four minutes for every degree he passed; and as there are 360 degrees on the circumference of the earth, these multiplied by four give precisely twenty-four hours—



PASSEPARTOUT SEIZED HIS MASTER BY THE COLLAR AND HURRIED HIM TO A CAB

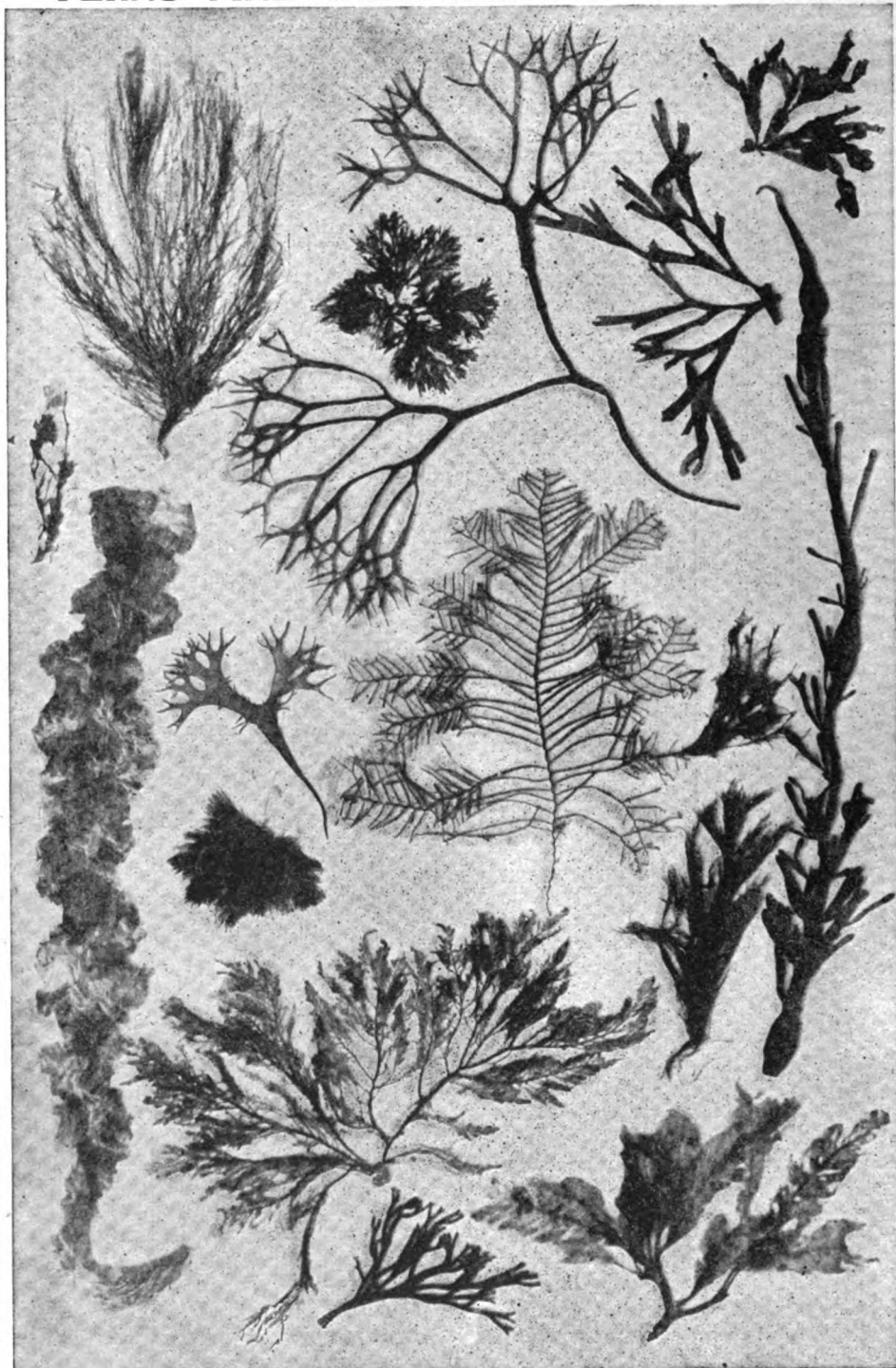
"you have made a mistake of a day! We have arrived twenty-four hours in advance, but you have only ten minutes now to spare to get to the club."

Saying this, the excited servant had caught his master by the collar of his coat and was dragging him towards the door, so that Phileas Fogg was out of his house and into a cab before he knew where he was. The driver, being promised a fabulous sum, made for the Reform Club, and arrived there after running over two dogs and colliding with five carriages. But Phileas Fogg was able to enter the reading-room at a quarter to nine precisely.

the day he had unconsciously gained. In other words, while Mr. Fogg was travelling eastward, he saw the sun at its meridian, which means directly overhead, eighty times, while his friends who remained in London had seen it only seventy-nine times. And that is how the famous watch of Passepartout, which had always preserved the London time, had lost a day.

There is nothing more to tell except that the charming Aouda, in due course, made Mr. Fogg the happiest of men. And one might make a voyage round the world for something less than that! The next Famous Books are on page 4985.

## FERNS AND FEATHERS OF THE SEA



We only realise the beauty and delicacy of the various seaweeds that are found in the waters round our coasts when we collect them and, after pressing the specimens, arrange them on sheets of paper, as shown here. All the "ferns and feathers of the sea" on this page are common specimens found abundantly round our coasts.



## A COLLECTION OF SEaweeds

**T**HERE are few natural objects that provide so artistic and graceful a collection as seaweeds; and as these are to be found in abundance and variety on all our coasts, it is within every boy's and girl's power to make a collection, for we all go sometimes to the seaside. Butterflies and moths may present more colour, and flowers may be more familiar to the eye, but for really artistic effect a collection of seaweeds is second to neither of these.

Some of the seaweeds found in foreign waters have stems of enormous length. One which grows in the Pacific Ocean has a stem over three hundred feet long, and another sometimes reaches the enormous length of fifteen hundred feet. But the seaweeds found round our own coasts are mostly small, and very suitable for collecting.

Of course, seaweeds have their commercial uses. Much seaweed is gathered every year and burnt to make manure for the land. This was formerly much more used than it is now. Other kinds are used as food for cattle, and one or two varieties are even eaten for human food. Then, again, seaweeds contain much iodine, which is sometimes extracted for medical uses. But it is not for these purposes that we shall collect seaweeds, but rather to provide an interesting hobby, and to give us a really attractive little marine museum that can be packed in a small space.

For the collecting of seaweeds a very inexpensive equipment is needed. We should have a stick with a hooked handle, which is useful for drawing ashore any weeds that may be floating a little distance out, a good knife with a strong blade for cutting pieces of the stouter weeds from the main plant, and a waterproof bag or a fishing-basket for carrying our specimens.

The seaweeds are to be found at high-water mark, where many specimens that

CONTINUED FROM 4778

have been torn off by the waves are left stranded, and they are also found at low-water mark. It is the coarser and bigger weeds that are found detached in this way, but in the rock-pools many of the finer and more delicate seaweeds grow in abundance, and these, although they do not look very attractive, perhaps, in the water, are beautiful when dried and mounted.

As beginners in the art of collecting seaweeds, we shall get all the specimens we need on the beach and among the rocks. The weeds very often have sand and other matter sticking to them, and this may be roughly rinsed off in the pools among the rocks.

When we get our specimens home, we should take a large basin, full of sea-water, and empty them into this. It is essential that we should use sea-water, as some of the seaweeds begin to decompose if placed in fresh water. If a large basin is not available a small bath can be used, but the basin is most suitable because we are able to see the specimens that are in it quite clearly.

After washing the seaweeds by shaking them about in the water, we should place them in another vessel containing sea-water that has been filtered through a piece of muslin or towelling. Here, again, a white dish is the best kind of receptacle that can be used, and it should be rather larger than the sheets of paper upon which we intend to mount our specimens. Card-ridge or any similar thick paper is suitable, and we may use two or three sizes for the different specimens. Five inches by three and a half inches, eight inches by six inches, and twelve inches by eight inches are all suitable sizes. It is well to have a sheet of perforated zinc, as this greatly helps in the mounting of the specimens. We place a sheet of paper upon the zinc, which may have one of its edges turned up to prevent the paper slipping off,



and then we pass these into the dish, beneath the floating specimen that we wish to mount. While the seaweed is still in the water, we remove any lingering impurities, such as grains of sand, with a camel-hair brush, and then raising our zinc and paper so that the specimen rests upon the paper, though it is still in the water, we arrange it neatly and artistically by means of the brush. If there are any ugly pieces or ends that spoil the general outline of the specimen, these may be snipped off under water with scissors.

So soon as the specimen is nicely arranged on the paper, we raise the zinc gently out of the water, taking care not to disarrange the seaweeds. The water runs off the paper and through the holes in the zinc. Now slide the sheet of mounting-paper, on which the specimen is resting, off the zinc on to a sheet of muslin or calico that has previously been laid on some sheets of thick blotting-paper.

### MOUNTING THE SEaweEDS

With a perfectly clean sponge of fine texture mop up the water that is lying on the paper, taking care, however, not to touch or disarrange the specimen in any way. Then lay over the paper and specimen another clean, smooth piece of muslin or calico, and on top of this several sheets of blotting-paper. The whole must then be put into a press, but the pressure must not be very great. If a press is not available, use large, heavy books, laying them on evenly and carefully. After two or three hours, the blotting-paper should be removed, and fresh paper put in its place, but the muslin or calico must not be removed. At intervals of twelve or fifteen hours, this process should be repeated, and at the end of four days the calico may be removed, and the seaweed itself transferred to dry paper, and, if necessary, pressed as before.

In most cases it will be found that the specimen will adhere to the mounting-paper under pressure without any adhesive material being necessary. Should it be necessary, however, to stick the seaweed down, the following is an excellent method: Boil some milk, and skim off the skin that rises to the top. Then placing the specimen upon a piece of smooth calico, with a sponge or soft rag moisten the paper with the milk, and lay the sheet carefully upon the weed, which will adhere to the paper. The sheet should then be put under pressure as before.

### HOW TO MOUNT THICK SEaweEDS

The thicker kinds of seaweeds, like bladder-wrack and its relations, should be washed in fresh water to remove the salt, and may then be dried between towels and pressed in the manner stated above. To affix these to the mounting-sheets, a little gum may be used. With these coarser weeds, if it is not convenient to mount them at once, we may allow them to dry in the air, and then, whenever we are ready to mount, we should soak them in boiling water for about twenty minutes. This removes the salt and other impurities, and afterwards they may be washed in fresh water, and pressed as described.

The sticky kinds of seaweeds, after being arranged on paper, should be allowed to dry in the air before being pressed, or they will adhere to the calico and be spoilt.

All specimens should have written against them the time and place where they were gathered, and their name and family, if possible. It will take time to identify all our specimens, but this may be done by consulting a book upon seaweeds with coloured plates, such as is to be found in most public libraries.

### CATALOGUING THE SEaweEDS

Like land plants, the great family to which the seaweeds belong are arranged in groups, and many of the species can be distinguished from one another only by close examination. This work of identifying what we have collected and mounted is, however, interesting, and, of course, a named collection is infinitely more valuable and creditable than a mere collection of odds and ends, the names of which are unknown. It is impossible here to give any account of the various species of seaweeds, but we shall find it helpful to know that there are three main groups—the green, the red, and the olive-coloured.

The first group consists principally of thread-like or net-like weeds, and most of its varieties are found not in the sea, but in fresh water.

The weeds belonging to the second group are exclusively marine. They are, as the name implies, nearly always red in colour, and are very light and delicate, and frequently almost transparent. Some are like moss in appearance, others resemble ferns, and others look something like coral. They are the most attractive of all the seaweeds from the collector's point of view, and many of those in the picture on page 4876 belong to this group.

The third group is also exclusively marine. The weeds belonging to it are generally large and coarse, and in foreign waters are almost like small floating trees. The very common bladder-wrack of our coasts, that coarse, brown weed with fronds and air-vessels that is found everywhere, and dries black, grows sometimes to a height of ten or eleven feet, and the clusters are often twelve feet or more in circumference. Some weeds of this group are small and beautiful, while others are flat.

### HOW TO KEEP THE SPECIMENS

When we have collected a large number of seaweeds and have arranged our specimens on sheets of paper as described above, so that they present somewhat the appearance shown on page 4876, the next question that arises is where and how shall we keep these sheets.

The sheets look very well indeed when framed and hung upon the walls of a study or dining-room. Expensive frames are not needed; those sold at about a shilling or eighteenpence each in many shops are quite good enough for the purpose.

Instead of a portfolio we can use a box, especially if we are collecting several specimens of each kind of seaweed.

Whatever may be the plan followed, the great thing is to observe neatness and order in the arrangement of the specimens.



# PRINTING AND FANCY LETTERING

THE art of lettering, by which we mean the ability to make ornamental letters as apart from those of ordinary handwriting, is a very useful one. People sometimes call them "printed" letters, because they are like those used in books—more often than not found on the headings and title-pages.

photographs, plants—for all these "lettering" is more suitable than ordinary handwriting. If we want to put the name on a boat, or gate, or over the top of a toy theatre, to write in a hat or cap, inside our school books, on a drawing-board or T-square; if we want to make good headings for our lessons or

*abcdefghijklmnopqrstuvwxyz*

1. An excellent type of small lettering, which may be printed with a pen or brush without difficulty.

We must have noticed these letters, and perhaps even thought how well they were arranged; but it may not have occurred to us that they all have to be made by a pen in someone's hand before the printing machine can produce them so neatly.

Our artists are constantly designing new and ornamental shapes and ways of making the alphabet, and when we know something about this very interesting art, we shall look with new interest at the title-pages of good books, and observe on many other things—such as statuary, monuments, buildings, tablets, and so on—how very beautiful the letters used in our language can be drawn.

Let us think of a few of the things which seem to call for "printed" letters rather than "written" ones.

To begin with, quite ordinary household things like addresses on parcels and baggage

examination papers, or put clear names on our maps—we shall find lettering most useful.

Then there are clothes to be marked with marking-ink, chests of small drawers needing labels of contents, handkerchief initials, Xmas cards, the outer covers of music and books, embroidery, wood-carving, and

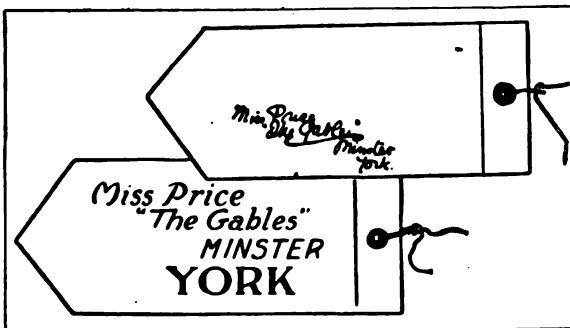
many other things where letters play an important part.

Here are a few simple rules in easy lettering, and two alphabets—as we see in pictures 1 and 3—which we must learn by copying them out several times as carefully as possible.

With these two styles we shall find ourselves able to letter anything quite suitably, and for ordinary purposes these are sufficient to know.

1. Do not mix up two kinds of letters in one word.

2. Remember that "thin up-strokes and thick down-strokes" applies to printed capitals as



2. A label written in the ordinary way and a label printed.

A	B	C	D	E	F	G	H	I	J
K	L	M	N	O	P	Q	R	S	
T	U	V	W	X	Y	Z	&	~	

3. The capital letters shown here are easily made, and, as can be seen, they may be arranged in squares.

are much clearer if done in neat, plain capitals, and so are more likely to be correctly read by busy porters and postmen. See picture 2.

Then there are lists of things such as those we pin up inside the doors of the book-case or music-cabinet or store-room; albums containing collections of things such as stamps,

well as to copybook hand. Look at picture 3.

3. Beware of cutting up a word into meaningless syllables.

4. Make bold letters, and give full prominence to each part.

5. Do not crowd the letters together, and make them quite straight on a line.

6. A useful point to remember when beginning is that each capital can be fitted into a square, except, of course, the letters I and J, which fill one square between them.

The letters in picture 3 have been done with a brush dipped in ink, which, by the way, is a better thing to use than a steel nib when brown paper or any other rough substance has to be written upon. Or a quill pen will make excellent letters.

Let us look at the pictures of the two luggage-labels on page 4879. Which is the clearer and more easily read? The bottom

one, of course, and yet it took but very little longer to do than the other. We must always remember to give prominence to the most important word by writing it in the largest letters, or using another set of letters, as we see has been done on the second label. This rule applies to everything—not only to addresses.

At first we shall need a pencil-line as a guide to keep the letters straight, but when we have become more accustomed to the work, we shall be able to do without this, just as we do without it in ordinary writing.

## A CABINET MADE FROM CIGAR-BOXES

WITH three cigar-boxes, and close attention to the instructions given in this article, we can make a very handy little wall cabinet

that will serve many useful purposes. Two of the cigar-boxes should be of similar size, but the third need not be quite the same size, as it is going to be pulled to pieces and the wood of it used. First we must take off all the paper. This can easily be done by damping with a wet sponge and letting the boxes stand a few minutes before removing the paper.

When we have got all the paper off, we must allow the boxes to dry gradually, and not seek to hasten the process by putting them in front of the fire, which would probably crack the wood. The third box we take apart, being as careful as possible not to break the pieces, and keeping the nails, which we shall use presently.

Most cigar-boxes have a brand-mark burnt in on the outside of the lid, so we turn the lids, making the inside what was formerly the outside.

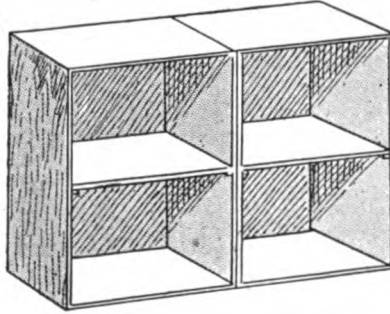
After cutting two strips of wood from the cigar-box that we took to pieces, and making them the proper size, we fit them into the cigar-boxes, as seen in picture 1, to do duty as shelves. Two nails from each side through the two sides of the boxes will keep them in position. Now we take two pieces of linen or cotton, cut them to some ornamental

shape, and glue them to the lid and to the back of the box, so as to make hinges, as seen in picture 2.

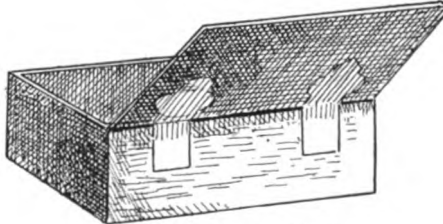
Then we glue the front sides of the two boxes face to face, and this will give us a two-compartment cabinet, with a shelf in the middle of each compartment, as seen in picture 1. With pieces of the broken box we make two slips—one to go right along the top of our cabinet outside and the other right along the bottom. Picture 3 shows that the piece on top and the piece on the bottom are similar in pattern.

Both should be glued on, and a few nails will help them also, but we must take care not to split the wood. Now by putting on a long piece top and bottom, supported by two brackets, which we cut from the third box, we can give our cigar-box cabinet both strength and ornamentation. We now cut a narrow strip of wood about half an inch wide and the length of the doors.

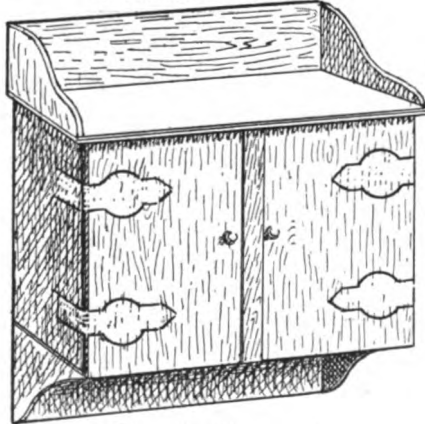
After rounding this on two of its corners, we glue it to the edge of one of the doors, so that it will come over the edge of the other door, as seen in picture 3. Two tiny brass knobs, one for each lid near its edge, will complete the cabinet, which we may hang in our bedrooms, and which we shall find convenient for museum specimens, for tiny bottles, for seeds, and many other things that boys and girls have and ought to keep in proper order.



1. Two boxes, with shelves



2. One box, showing hinges



3. The wall cabinet complete

## CAN YOU MAKE THESE INTO PICTURES?



It is difficult to recognise these objects if we look at them in the ordinary way, but any boy or girl can make them into pictures by looking at them properly. By holding the page horizontally some distance away, on a level with our eyes, so that we look along the page, we shall see some fruit, a kitten playing with a ball, a bird, and a house. The reason for this is that the pictures are drawn with the perspective wrong.

## HOW TO CHOOSE CHRISTMAS PRESENTS

THE art of choosing Christmas presents lies not only in studying the tastes of the persons for whom they are intended, but in finding out precisely what is needed in each case—sometimes a very difficult task.

With Christmas so near at hand, a few suggestions may, perhaps, not be unwelcome. To begin with, of course, we must remember that pocket-money is by no means elastic; it has, on the contrary, an unpleasant habit of shrinking very quickly long before we have half finished our purchases, so that, though we naturally scorn things of the "cheap and nasty" type, they must be as inexpensive and as original as possible.

At the top of our list comes mother. It is just possible that she might be in want of a new thimble; if so, the silver ones lined with steel are by far the best, for they wear excellently. A good one costs about 90 cents, but if that is too dear she might like a leather spectacle-case, costing about 25 cents, or, better still, one of the chateau pattern to hang on to the waistband at about 75 cents; or a little bottle of scent—one can, of course, pay anything from 10 cents to \$2 for this—or a cosy pair of bedroom slippers, which can be bought for \$1 or thereabouts.

### SOME INEXPENSIVE PRESENTS

And if all these things are too expensive, why not buy a dainty calendar to hang up on the wall? Or we might make a little pin-cushion of flowered cretonne stuffed with bran. We could, no doubt, find some odd pieces from chair-cover cuttings. The cushion, which should measure about seven inches square, should be covered with white book-muslin with a pleated or gathered frill all round the edge, finished off with a dainty bow of pink ribbon. We should choose a big rose-patterned cretonne, so that the colour shows very distinctly through the cover.

A tiny "Dorothy Bag," made of silk, or brocade, to hold a ball of crochet cotton is useful and easily made. If we are not sure how to cut it out, we can look at page 2569.

If we begin early, nothing, of course, could be nicer than to work the ribbon-work table-square described on page 2133, or the handkerchief or glove sachets mentioned on page 1204, or the brush and comb bag on page 232.

Flower-pots make pretty gifts. They are now to be had in soft shades of blue and green and pink, and quite artistic shades can be bought for 25 cents or 30 cents; or, of course, one can spend a little more and get something quite delightful in beaten copper-work or brass. A fern or aspidistra plant will fill an odd corner of the sitting-room; or a pair of glass flower-vases for the table, at about 25 cents or 30 cents each, is certain of finding a welcome.

### PRESENTS FOR A GIRL

Those of us who have grown-up sisters or aunts who must not be forgotten will find many of these things quite as suitable for them.

A grown-up sister would love a silver pocket-mirror, which we could buy for 50 cents or 75 cents, or a fancy hatpin, which would

cost less. A silver hatpin-stand for the dressing-table can be bought for about 80 cents. A pair of gloves at \$1, or a little embroidered handkerchief, for which we need not pay more than 15 cents or 20 cents, or a veil, are certainly not very original, but nothing is more sure of a welcome.

The hockey-scarf mentioned on page 1348 makes a useful present; so does the Dorothy bag already referred to, if it is made big enough to hold a pair of party shoes; or it might even be cut square for a work-bag for mother. An old lady might like one of these bags in silk for a church bag, to carry her Prayer-book, hymn-book, handkerchief, spectacles, or any other small articles.

### USEFUL AND ATTRACTIVE GIFTS

A big sister might like one of those little rolled-gold safety-pins which are so useful to fix a blouse-tie or a turn-over collar. These cost about 25 cents. Or a little "safety" purse, either in leather with a long silk cord attached, which costs about 50 cents, or, better still, the kind described on page 4028, which we could, of course, make ourselves.

A bag for carrying opera-glasses is another useful present. These bags are made now in various colours with a little looking-glass underneath. The bottom of the bag is stiffened to hold the glass firm, and the top is drawn up by a cord. These cost about 50 cents or 75 cents, and are really very useful to anyone, for they hold a purse and handkerchief as well as the glasses.

A miniature edition of the poets makes a charming little present. All the bookshops keep quite a big selection at prices varying from 35 cents to \$1.50.

Then, again, nothing can be more useful than a buckle in silver, or in that art metal-work which is now being used a great deal in very attractive designs. These cost about \$1.

Many fancy-shops keep useful little black silk knitted purses with gilt frames to fasten to one's umbrella. These are useful to people who travel much by omnibus or trolley-car. They are made to hold two or three cents or a railway ticket, and only cost 25 cents.

Many girls would welcome a manicure buffer. We should choose the large wooden ones at 25 cents or 50 cents in preference to those made in silver, which are not nearly as serviceable.

A song makes a welcome present if a girl is musical, and costs only about 30 cents.

### WHAT TO GIVE A MAN

Next on our list comes father. Men are not so easy to cater for, for after we have thought of pipe stands, slippers, ash trays, and tobacco-boxes, there seems to be very little left. Suppose we buy a little spill-vase in blue and white china for 25 cents, and make about a hundred paper spills to fill it by cutting off the white edges of old newspapers and folding these quite tight. A basket-work wastepaper-basket—quite a good one can be bought for 50 cents—or a 25-cent paper-knife might be appreciated.

If we can afford something a little more expensive, a little gold stud for \$2, or a set of fancy vest-buttons, which might cost anything from 50 cents to \$3, make nice presents.

A tie is often appreciated, but it should be chosen very carefully, not only as regards colour, but style. If it is to be a girl's present, she should try to get a man to choose it for her. Men do not like "made" ties; they much prefer the kind they can tie themselves.

If we can afford as much as \$2, a fountain-pen of any of the well-known makes is an excellent present; if \$2 is too much, a big brother or sister might be quite pleased with a "stylo." We can get this for 25 cents, or quite a nice one can be bought for 30 cents or 75 cents.

If a man bicycles or takes photographs, there are endless little things that he would welcome—a new lamp, costing 25 cents or 50 cents, a bell at 25 cents, a snapshot album at the same price—even a roll of films which will cost from 15 cents to 30 cents, according to the size of the camera for which they are intended. Then there are very nice little stamp-cases

which can be bought for 25 cents, and some leather purses which would no doubt be acceptable. A diary, with pockets, costs anything from 25 cents to 75 cents, or one can buy a neat-looking wallet for 50 cents or \$1. A 25 cent penknife, a pipe, or even a packet of favourite tobacco might find favour.

A good idea for an acceptable present for a boy who is fond of painting is to get hold of his old paint-box and refill it with new paints. Here are the colours to ask for; they will cost from 35 cents to 60 cents each from any shop:

Gamboge	Cobalt Blue
Burnt Sienna	Vermilion
Brick Red	Chinese White
Hooker's Green	Yellow Ochre
Crimson Lake	Prussian Blue

In this way we shall get quite good paints, far better than those supplied with the cheaper boxes one buys ready filled.

Without knowing the person for whom the present is intended, it is difficult to offer advice, as everything depends upon what he or she wants; but if we can only discover this, our present will be a certain success.

## MAKING AND USING A PAIR OF STILTS

STILT-WALKING is good healthy exercise, and any boy can make his own stilts, so that the pastime can be followed without the expenditure of much money, or, indeed, of any money at all. It should be possible to

get two pieces of wood six or seven feet long and about one and a half inches square. The wood should be as free from knots as possible, because knots rather weaken the wood. The pieces of wood should have a shoulder made

in each, as seen in pictures 1 and 2, about two feet from the bottom end. Then from this shoulder the wood should be made to slope up for a few inches, as also seen in these pictures. Now we make two blocks, as seen

in picture 3. These blocks should be three and a half inches wide and just as thick as the stilt-leg that we have already made. We should fix the blocks, as shown in pictures 3 and 4, into the shoulders. Now we want to fasten the blocks to the stilt-legs. We can do this by putting nails, long screw-nails for preference, right through the legs into the blocks, taking care not to split either of them. An easier way is to put a piece of board cut to the proper shape on both front and back of each stilt, as seen in picture 4, and if this piece is made the exact height of the top of the block it will increase the size of the foothold, which is a good thing to do.

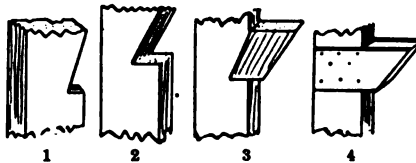
The top half of the stilts should be cut round instead of being left square, so as to give a good grip for the hands. This can be done with a pocket-knife or a spokeshave. We may, if we like, smooth the handle part by

scraping it with a piece of broken glass, or by rubbing it with sand-paper. Now the stilts are ready for use, and a little practice will enable us to feel at home in them.

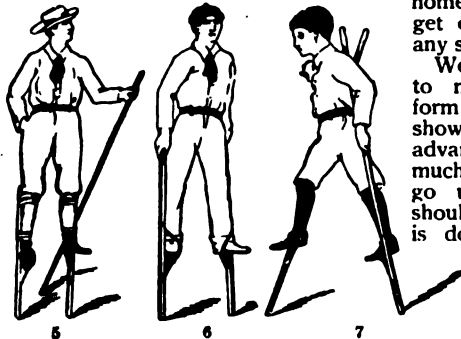
The upper part goes behind the shoulders, as seen in picture 7, and below that the hands grip the round part, so as to steady the bearer. When we practise with the stilts we must begin by mounting them beside a wall or a fence, but after a time, when we have begun to feel more at home, we shall be able to get on to them without any such aid.

We have described how to make the simplest form of stilts. Picture 6 shows a boy using a more advanced pair. They are much shorter, and do not go up as far as the shoulders. The steadying is done by the hands,

which are held not quite fully extended. Also the feet-blocks have straps to steady the feet. Picture 5 shows a yet more advanced type. Here all the work is done by the legs, and there are knee-straps as well as foot-straps, the hands not holding the stilts at all. A long pole is held in one hand to help to steady the user.



Making the step, or tread



Three different kinds of stilts





# EASY GAMES WITH PLAYING CARDS

## SPADE THE GARDENER

THERE are a number of simple and easy games that can be played with ordinary playing cards. Spade the Gardener, for instance, is a form of the game generally known as Happy Families. The number of players should be not fewer than three and not more than five. The cards taken from the pack and used for the game are the kings, queens, knaves, aces, and tens, so that twenty cards are used.

The cards are given special names. The king of spades is known as Spade the Gardener, and thus the game gets its name. The queen of spades is called Spade the Gardener's wife, the knave of spades is Spade the Gardener's son, the ace of spades is Spade the Gardener's servant, and the ten of spades is Spade the Gardener's dog. The king of clubs is known as Club the Constable, the king of hearts is the Good-natured Man, and the king of diamonds is called Vicar Den. Then these three have each a wife, a son, a servant, and a dog, just as Spade the Gardener has, these being the queen, knave, ace, and ten respectively.

The cards are divided equally. The object of each player is to get possession of all the twenty cards. Suppose that one player has the Good-natured Man's wife. It is his turn to ask, and he asks any of the other players to give him the Good-natured Man. If he is lucky enough to have asked it from the player who has it, it is handed to him, then he can ask for another of the family, and he may succeed in getting his family complete, in which case he can go on asking for cards to complete other families.

The first time, however, that a player asks for a card that the person asked does not possess, the privilege of asking passes to the person asked for the card.

If a player has had to give up all his cards, he retires from the game. After some time the families will all be completed, and will be in the hands of the various players who are still in the game. Then the player who has the privilege of asking demands from one of the players a family, such as the Club the Constable family, and if the player who is asked has the family demanded, he must hand it over. Thus all the families finally get into the hands of one player, who thus wins the game.

## OLD MAID

THIS game is played with an ordinary pack of fifty-two cards such as is used in playing whist. One card is taken out of the pack and put aside. It is better if no one knows what card has been taken out, although some people in playing the game take out the queen. When one card has been taken out and put aside, the pack, which now contains fifty-one cards, is dealt one by one to all the players until it has been divided. Now each player looks at his cards. If he has two of one kind—such as two kings, two eights, and so on—he throws those two into the middle of the table face downwards. Every player throws away all the pairs of this kind he

holds in his hands. When all the players have done so, the player on the left of the dealer holds out the remainder of his cards, back upwards in the form of a fan, and the player on the left selects one from them without seeing the face of the card he takes.

If the card taken pairs with one of his own cards, he throws the pair upon the middle of the table; but if the card taken be unlike any other card in his hand, he must retain it. Then he holds out his cards and allows the player on his left to take one.

As pair after pair is thrown on the table, the cards in play become fewer and fewer. Every player who succeeds in pairing all his cards is out of the game. At last one player is left with only one card, which will be a card of the same kind as the card originally withdrawn from the pack. That player is called the old maid or the old bachelor.

## SNIP-SNAP-SNORUM

THERE is more than one card game played under this name. The game which we shall describe here is the simplest form of it. Any number of persons may play at one time. The cards used are an ordinary pack containing fifty-two cards, such as are used by whist-players. Each player has in front of him five or six counters.

The cards are dealt out all round in the usual way in card games. Then the player on the left of the dealer lays down a card, face upwards on the table. The player next on the left now puts down a card of the same face value if he can—that is to say that he puts a queen upon a queen, or a seven upon a seven, and so on. At the same time he cries *snip*. If he does so, the first player has to put one of his counters in the pool.

It is then the turn of the player next on the left. If he has a card of the same value, he plays it on the other two cards already played and at the same time cries *snip*. Then the second player has to put two counters in the pool. If the next player still on the left after the third can put another card of the same value upon the three that have been played, he does so and cries *snorum*, and the third player has to put three counters in the pool. As there are only four cards of each in the pack, it is impossible to go any farther than *snorum*.

We have supposed that the four consecutive players have each had a card of the same value. This seldom occurs. If the second player has not a card of the same value as that played by the first player, he cannot play, and although another player may have a card of the required value, he cannot play either. The playing must be consecutive from the right to the left. So if any player cannot play, it is the turn of the player who put down the last card to lead another card. He does so, and the player on his left tries to *snip*, or match, that card.

When a player has lost all his counters, he retires from the game, which is won by the player whose counters last longest and who then takes the pool.

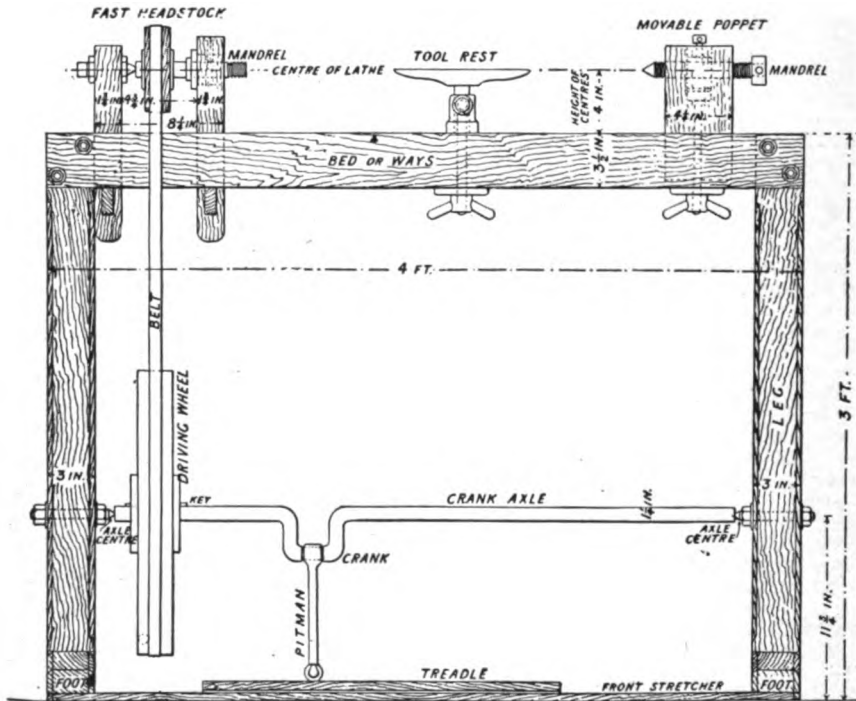


## HOW TO BUILD A BOY'S LATHE

A LATHE is a machine in which pieces of wood or metal are turned to circular shapes. Good lathes are expensive if purchased, because they are made wholly of metal, and are produced very accurately. Consequently many lads who would wish to possess one are unable to save enough money to do so. With the exercise of a little skill, some slight help, and a small outlay, many of us will be able to construct a very simple lathe in which most kinds of plain turning can be done just as well as in one built more expensively by an engineer. The lathe is shown in pictures 1, 2, and 3, and its separated parts subsequently. We shall see that it is cheapened and rendered easy of construction by being made mostly of wood.

the legs, or uprights, each of which is made for simplicity of one solid piece of plank, of any one of the woods just named as being suitable for the bed. Each is cut either from a common deal or hardwood plank measuring 9 inches wide by 3 inches thick in the sawn sizes, and cut off to 3 feet in length. The pieces must be smoothed over with a plane, and the sides cut tapered as seen in picture 2, running from 9 inches wide at the bottom to 6 inches wide at the top.

The dimensions thus far are not very important, but those now to be noted are. The top of each leg has to be shouldered to receive the bed-ways, and the bottom of each has to be tenoned into its foot. These and other dimensions are marked from a *centre*



1. An easily-made foot-lathe for a boy, showing all the different working parts

The very few portions which are of iron may be readily obtained. Anyone attempting to make the lathe should be familiar with the methods of jointing wood explained on pages 1345 and 1346.

The working parts are placed on supports termed the *bed*, or bed-ways, which are carried on the *legs*, also called uprights, or standards. The bed-ways are made of two strips of deal, or beech, birch, mahogany, or oak, well seasoned and free from knots and flaws. Each measures 4 feet long by 2 inches wide by 3 1/2 inches deep. These must be planed lengthwise truly on each side, and each adjacent side must be quite square with its fellow. If we cannot use the plane well, some carpenter will do this work for us in half an hour. These ways are fastened to

*line*, and not from an edge. This is important. The bed must be fastened securely to the legs. The best plan is to saw shoulders out of the legs at the top, as shown in pictures 2 and 4, and shoulder the ends of the bed-strips also. Then two 3/4-inch bolts at each end will be driven through holes bored through bed-strips and uprights.

At the bottom the legs are tenoned into the feet, as seen in picture 5. Two tenons are cut on the lower ends of the legs, and mortises to correspond in the feet. Observe that the mortises are wider than the tenons at the bottom end. This is to permit of the insertion of the wedges shown, to be driven in when the tenons are being glued. Picture 5 shows the appearance of the joint when made thus, before the ends are

## HOW TO BUILD A BOY'S LATHE

trimmed off neatly. A pin or peg is driven in a hole bored through foot and tenons. The legs are maintained rigidly apart at the top by means of the bed. At the bottom two strips of wood form *stretchers*, seen in pictures 1, 2, and 3, and are screwed to the feet at the back and front, being shouldered into the feet flush with the bottom. The timber-work will look all the neater if we *chamfer* the edges, as a carpenter would say, that is, plane off the keen angles at an angle of 45 degrees, as shown in the pictures on these pages.

We now come to a rather troublesome fitting, the crank, treadle, and pulley or driving-wheel. The crank, which is seen in pictures 1 and 3, must be bought. In most of the larger cities and towns we can always pick up a secondhand one for a trifle at a large junk-shop. It may have a pulley on it, and if so that will save trouble. But if not, we can make a pulley of hardwood, the heavier the better. The disadvantage in buying a pulley is that it will have two or three diameters or steps, and probably be grooved for driving rope. A belt is preferable, and a single pulley that is not stepped renders the fitting of the headstock easier. A foot-lathe can be run faster or slower by the working of the treadle without changing the belt from one step to another. If we prefer pulleys with two steps and can make them, the lathe will be rather more handy.

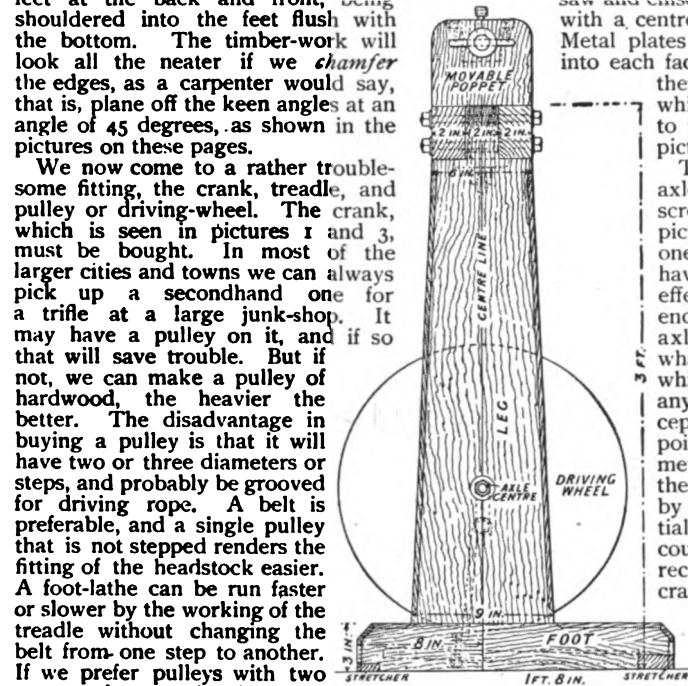
The timber for the pulley should be the heaviest we can obtain, oak for preference, and if we cannot get oak, use birch or beech. Obtain stuff 1 inch thick, cut into narrow strips from 4 inches to 6 inches wide, and screw them crosswise side by side, as may be

the belt, but three are fitted to increase the weight, which is a very desirable thing. After screwing or nailing the strips together, mark a circle with a compass for the outside 2 feet diameter, and another circle for the hole, 1 1/4 inches diameter. The first must be cut with saw and chisel, and the second bored with a centre-bit to fit the crank-axle. Metal plates must be screwed on or into each face, with key-ways filed in them to receive the key by which the wheel is made fast to the crank-axle, as seen in pictures 1 and 6.

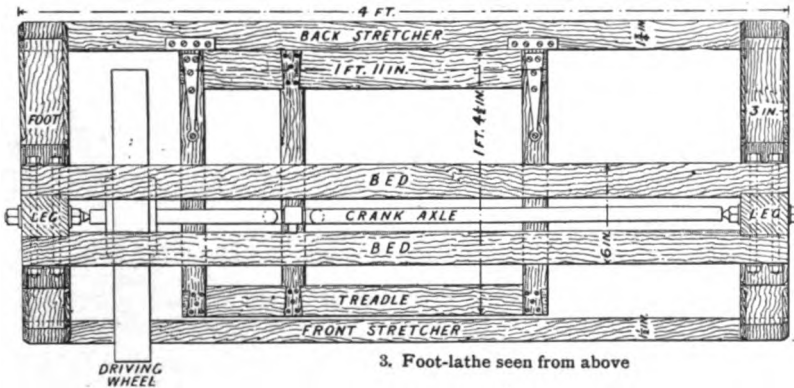
The ends of the crank-axle are recessed to receive screwed *centres*, as seen in pictures 1, 2, and 3, fitting one in each upright, and having a nut at each end for effecting adjustment of the end pressure on the crank-axle. These are made from what are termed *stud-bolts*, which can be obtained at any hardware store, except that the ends must be pointed subsequently. A metal-turner would point these, or it might be done by careful filing. It is essential that these points and the countersunk holes or conical recesses in the ends of the crank-axle should be case-hardened. To do this, get the parts red hot, and rub them in powdered yellow prussiate of potash. Then quench in water. Repeat this

three or four times. A better plan is to cover all except the extreme ends in clay, and expose the ends to the heat of a clear fire for an hour or two in contact with powdered prussiate of potash, and then quench in water. The crank is turned by a *treadle*, and rod,

or *pitman*, reaching from crank to treadle. The latter is made of wood, framed as in picture 3, and hinged to the back stretcher, which connects the two uprights. Some axles have two cranks and



2. Leg of foot-lathe

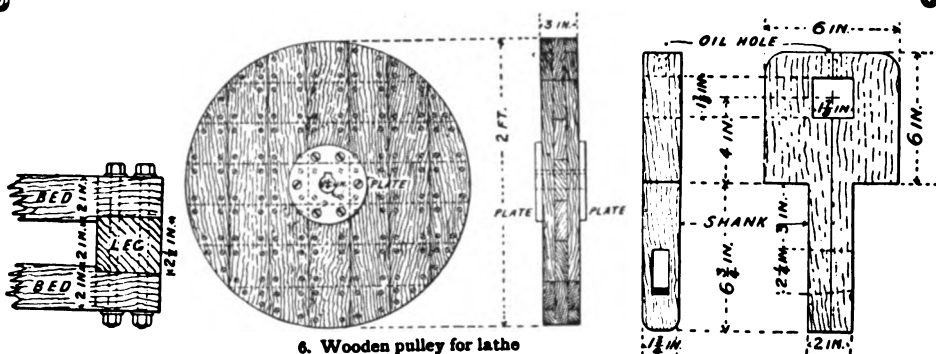


3. Foot-lathe seen from above

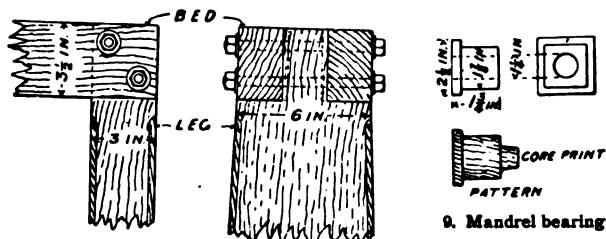
seen in picture 6. If we make it from one piece of solid wood it will not remain round, and will perhaps split or curve. But built as shown in picture 6 it will remain accurate for an indefinite period.

Two thicknesses would be sufficient for

others only one. One is sufficient. An eye is fitted tightly into the treadle to receive one end of the pitman, and the other end is hooked to fit over the crank. Pressing the foot on the treadle pulls the crank downwards. On lifting the foot the treadle is lifted upwards by



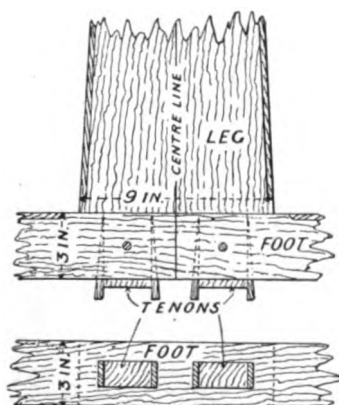
6. Wooden pulley for lathe



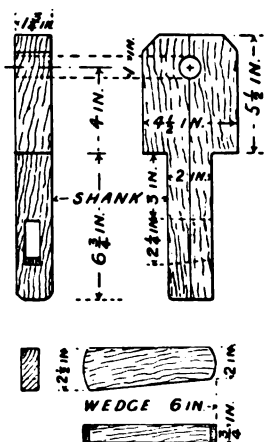
4. Method of jointing leg

7. Headstock of lathe

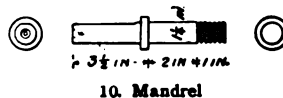
9. Mandrel bearing



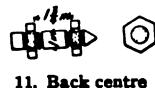
5. Tenon of leg



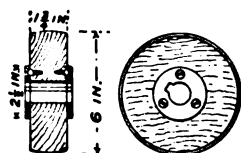
8. Headstock of lathe



10. Mandrel



11. Back centre



12. Pulley

the momentum acquired by the heavy wheel. The method of framing the treadle is not by tenons, but by means of half-lapped joints with dovetailed ends, as seen in picture 3. This is rather easier than tenoning. The joints are sawn and planed—using a rebate plane—then glued and screwed. The straps of the hinges cover over the hinder joints where the most severe strain comes. This treadle should be made of hardwood, preferably oak. We can purchase the pitman secondhand for a few cents, or get a smith to forge one. This completes the framing of the lathe, leaving the headstocks and tool-rest still to be done.

On the strong and stiff framing which we have just seen how to make, the actual apparatus for turning has to be fitted. This, as shown in the pictures, is so extremely simple that we should try not to think that it is like the lathes made for sale. It is

designed so very simply that most lads may construct it with little assistance. But lathes very much like this may be seen in some of the old wood-turner's shops, and good work is done with them.

We shall begin with the upper fittings on the bed, making references first to pictures 1 and 2. These comprise the fast headstock to the left, the movable poppet to the right, and the tool-rest between. The first drives the work, the second supports the right-hand end of long pieces of work, and the cutting-tool is laid upon the third.

The headstock, seen in picture 1, is built of two pieces of any hardwood—beech, birch, or oak—cut and shaped to the dimensions given. Two uprights, seen in pictures 7 and 8, are shouldered at the bottom to fit between the ways of the bed. The tails or shanks project far enough downwards to allow room for cutting mortises and fitting

## HOW TO BUILD A BOY'S LATHE

wedges. These, being driven underneath the ways, hold the uprights down securely on the bed. All this is made in any good sound hardwood.

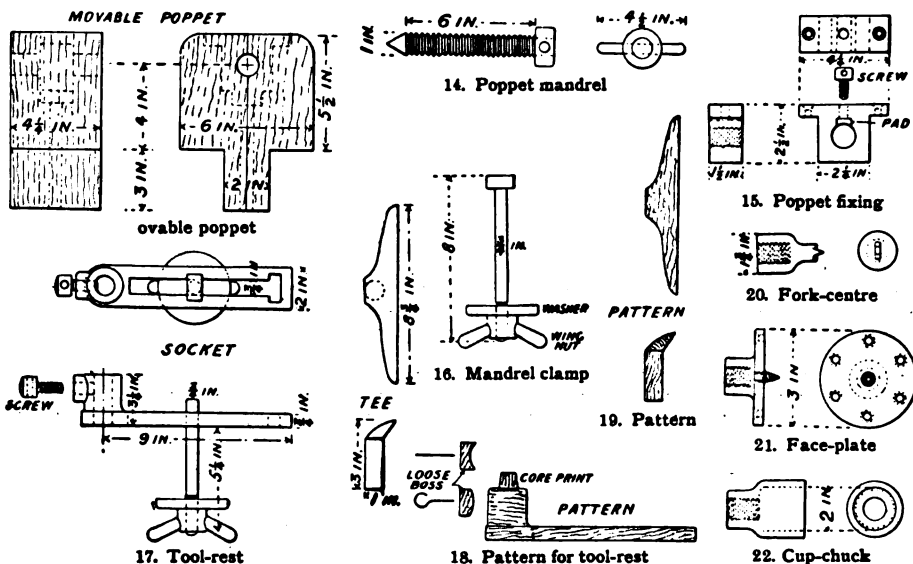
In the vertical centre line of each upright—that is, exactly midway between the ways of the bed, and at a height of 4 inches therefrom—a hole will be made in each piece. The hole in front is square, as may be seen in picture 7, to receive a small brass casting, seen in picture 9, which forms a bearing in which the *mandrel*, seen in picture 10, is to be fitted.

For this casting a pattern has to be made in wood, and cast in brass, with a hole in it formed by the *print*, and bored smoothly. The casting will be fitted neatly into the square hole in the upright seen in picture 7, and driven in with a hammer. In the other upright, shown in picture 8, a 1-inch round hole will be bored with a centre-bit to receive a screw, termed a *back centre*, with two nuts, and one end pointed, as seen in picture 11. This must be of steel, and hardened similarly to the crank axle-centres. The mandrel must be prepared by a metal-turner to the dimensions in picture 10. It is made of steel, and is recessed at the back end to receive the point of the screw just mentioned. It has a collar turned on it which bears against the hinder face of the brass bearing fitted in the front upright.

This will be made clearer by referring to picture 1. At this end also a screw is cut on the outside to receive *chucks* for holding work. If we show this drawing to a metal-turner he will understand it, and make the mandrel like it. To insert the mandrel, the back upright, seen in picture 8, must be removed, the mandrel inserted in its bearing, and the back upright brought into place and wedged. The nuts on the back centre afford means for effecting an exact degree of pressure on the collar, so that the mandrel will run freely without being too loose. The mandrel is driven by means of a belt

on a *pulley*, as seen in pictures 1 and 12. This is bored to fit tightly over the mandrel. This fit alone would not prevent it from slipping round, but a key is necessary; and to prevent the key from splitting the wood a plate of iron is fitted into or on each side, and screwed there, and the slots for the key are filed in the plates as well as cut through the wood. A flat portion is filed on the mandrel to prevent the key from slipping round. Being driven in tightly with a hammer, it secures the pulley firmly on the mandrel.

The movable poppet, seen in picture 1, is also an extremely simple affair, being made of a block of hardwood, shown in picture 13. It has to be moved along and tightened at various positions to suit work of different lengths. The work is centred on it, for which a mandrel, shown in picture 14, is provided. The very simplest way to do this is to get a steel screw made, pointed at one end, and having a round or cheese head at the other, through a hole in which a lever is fitted to turn it by. The screw runs in a nut, seen in picture 15, cast from a pattern or filed from a block of brass or iron, which is fitted into a recess cut in the head, shown in picture 13. The centre of the nut must be in the exact centre corresponding with the centre of the mandrel in the fast head-stock—namely, in the middle of the bed- cheeks, and 4 inches above them. When the head is fastened down on the bed, the movement of the screw is utilised to effect a secure support to the work, neither too tight nor too loose. It is not a simple nut only, but comprises the nut seen in picture 15 and a clamping screw and *pad* combined. The pad and screw are necessary to pinch the screw mandrel tightly in position when set up to the work. The pad fits the screw as far as it occupies a portion of the nut. It can be cut out of a common nut, and the recess for it filed in the main nut. If the



mandrel-screw were pinched by the end of the screw, it would soon become bruised. The nut is fitted in the head, and secured to it by means of two little flanges, through which wood screws are run into the head.

The movable poppet might be wedged down upon the bed similarly to the headstock. But the constant shifting about to which it is subjected renders another method of clamping desirable, that, namely, of a screw and wing-nut, as shown in picture 16. A common bolt has its head sunk into a recess cut in the block, seen in picture 13, a little way below the nut recess, and its body is passed through a hole bored down the centre and projecting below the bed-cheeks. Over this a washer fits large enough to bridge the cheeks, and a wing-nut below pinches the head down. An ironmonger could supply these parts.

The *tool-rest*, seen in picture 17, must be made of iron, cast from patterns shown in pictures 18 and 19, one for the *socket*, the other for the *lee*, which is the actual rest. We should be able to make the patterns by following the drawings. The pattern in picture 18 in plan is cut like the socket seen to the left, and the boss for the screw is fitted loosely with a wire. Then some metal-worker will fit a screw to the socket for pinching the tee-rest in any required position, and one for holding the foot down to the bed. Three chucks will be required, a fork, a

face-plate, and a cup-chuck, all as shown in pictures 20, 21, and 22 respectively. The first is for holding and driving work between centres; the second for large, thin pieces supported by the fast headstock mandrel only; the third for pieces which are neither large nor long, supported as in the last case. These are all screwed on the nose of the mandrel, and interchange. Picture 20 must be made by a metal-turner; 21 and 22 are cast from patterns similar to the castings, and either in brass or iron, but they have to be screwed by a turner, when the chucks can be turned up truly in their places.

The prong, or fork, of the chuck, seen in picture 20, is driven into one end of the piece of wood which it has to rotate, the fork affording the necessary leverage. All work which exceeds a few inches in length is driven thus, the farther end being supported on the mandrel centre of the movable poppet.

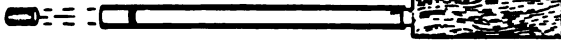
One face-plate, picture 21, is shown. The screw in the centre holds very small pieces. Larger pieces must be secured with wood screws put in from the back through the holes.

The bell or cup chuck, seen in picture 22, receives short pieces of work which have to be turned or bored out on the front end. The wood is driven into it with a hammer, and is thus held without any further assistance.

A leather belt  $\frac{1}{4}$  inch or 1 inch wide will be required to drive the lathe. It can be obtained at a saddler's or leather goods shop.

## A POPGUN MADE FROM A QUILL

A **QUILL** popgun is an amusing little toy that any boy can make without expense. All that is needed is a good quill of fair size that we can make from a goose-feather by pushing out the pith. We cut the quill evenly at each end, and make it about



The popgun made from a quill

three inches long. Now we take a raw potato, and cut it into slices about a quarter of an inch thick or a little more. We push one end of the quill through one of the slices of potato, and this will cause a piece of potato to stick in one end of the quill. Then we push the other end

of the quill through a slice of potato, thereby getting a piece of potato at that end also. Now we make a piece of wood as shown in the picture. This is to act as the rammer. The thin part should be almost the

size of the quill, and the thick end is to prevent it from going too far through the quill.

Then, by pushing this rammer into one end of the quill, we can fire our popgun, which we can load as often as we wish by pushing the empty end into a slice of potato. The quill popgun makes very good amusement.

## ANSWERS TO THE PICTURE

ON page 4766 we have a picture of a street scene in which the artist has purposely drawn many things wrongly. The observant reader will notice the following mistakes.

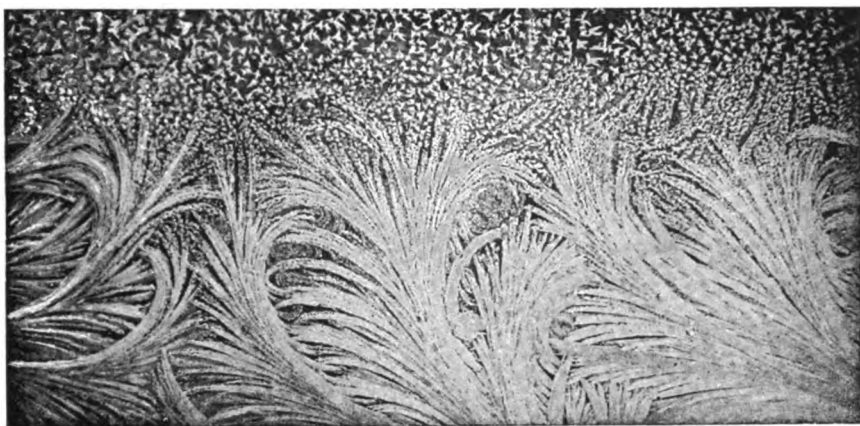
1. The lamp-post should stand on the pavement, and its ladder-arm is on wrong side.
2. The notice of "Keep to the left" should read "Keep to the right," and is on wrong side of the lamp-post.
3. The pavement has no curbstones.
4. The bars of the gutter grating are the wrong way up, and they should also be at right angles instead of parallel to pavement.
5. The cyclist's front forks are wrong.

## PUZZLES ON PAGE 4766

6. The truck's handles are also the wrong way round.
7. The motor-car has the handle of its door and its taximeter in their wrong positions, and the license number is in its wrong place.
8. One of the window-sashes on the first floor of the middle shop is wrongly placed.
9. The words "To Let" are made to read from the inside instead of the outside, as it should.
10. In the right-hand corner of the picture the end of the hand-rail on each side of the steps curls the wrong way round.



THE NEXT THINGS TO MAKE AND THINGS TO DO BEGIN ON PAGE 4993



## MASTER JACK FROST, ARTIST

Just before you get to the North Pole there is a dear little shop with two bow-windows, two steps down to the door, and two dormer windows in the tiled roof, which has inscribed on its front, in a perfectly charming design, the words: "Jack Frost, Plumber and Glazier."

I have not myself visited the shop, but I got the description which I have just given to you from no less a person than the owner and occupier himself, whom I chanced to meet one cold night in the North of New England.

The meeting was rather romantic, not to say exciting. I was staying at a strange inn on some wild hills, and went to bed in a nervous and excited state.

Well, I dropped off to sleep after a miserable hour of listening to creaking furniture, feeling all the time that I should certainly be attacked; and when I awoke, soon after midnight, it was with the certain conviction that I should have to fight for my life. There was a cracking noise from the window.

I felt desperately cold; indeed, I was shivering, and my teeth *would* chatter, however hard I tried to

CONTINUED FROM 4815



stop them. I glanced, with terrified eyes, across the darkness of the room, and there against the faint luminous square of the window was the grey shadow of a man who seemed to be only just outside. I was crossing the floor on the tips of my toes, when I heard the man outside the window singing, in a low voice, the following words:

I'm a cracker of pipes,  
And a burster of drains,  
But a *beautiful* painter  
Of window-panes.

Amazed that any robber should sing at his wicked work, I stood still. The cracking sound continued, and the shadow began to fade till it was almost dim. As it faded I heard the voice outside singing cheerfully:

I give little boys cold,  
And make little boys sneeze,  
But I glorify gooseberry  
Bushes and trees.

Before I took another step forward, the voice outside the window sang: "Hullo, you inside there! Pull up the blind and take a look at my work."

Without pausing to think I advanced quickly, jerked aside the blind, and saw, not a burglar, not a man at all, as I had quite expected, but a beautiful picture instead.

For the whole window, from the eight panes in the top sash to the eight panes in the lower sash, was frosted over in a thick and glittering iciness which not only caught the starlight outside at a thousand tiny points, but expressed some wonderful design full of beauty.

As I stood there, all of a sudden up shot the lower sash, a blast of cold air pierced me to the marrow-bones, and into the room sprang a wisp of a man with a very white face and a very blue nose.

"Name of Frost," he said in a sharp voice; "Jack Frost. Address, Icicle Villa, Snow Place, North Pole. Trade, plumber, glazier, and decorator."

I at once hopped under the bed-clothes, and then said to my visitor:

"It gives me the greatest pleasure to make your acquaintance. I have heard of you before—"

"I suppose so; but you know nothing about me. You do not know that I live near the North Pole, in a neat little shop, with two steps down from the pavement to the front door, two dormer windows in the tiled roof, and with a ribbon design over the front, announcing Jack Frost, Plumber and Glazier."

In answer to this, I ventured to reply: "I know you are clever in turning water into ice, giving people colds, and making clouds come down as snow; but as to whether you are married, whether you are a Republican or Democrat—on these things I am ignorant."

He crossed his legs and said sharply:

"I am an artist. In point of fact, I am the greatest artist on earth. And it is far from encouraging to find that people do not recognise me as such."

"You should put N.A. after your name. That is the only means of knowing an artist in America."

"You're laughing at me!" said he.

"My dear fellow, my teeth are chattering. I was never farther from laughter in all my life."

"Look here, I'll explain how things are. You shall judge for yourself. You know how precious ugly it is in autumn

after the leaves are down? You know how sodden the lawns look, how bare the trees look, and how muddy and sloppy and disagreeable the roads are? Well, those are my materials. At the worst season of the year I am sent for by Nature, and told to do the best I can with bare trees, sodden grass, and muddy roads. And just because I happen to burst a few water-pipes, and bring one or two gouty old gentlemen down on a slide, and set a few thousands of weaklings sneezing—I am abused by men and women, and not a single soul even praises my beautiful pictures!"

"Oh, come, now!" said I, "I've heard people praise a good white frost—"

"Bah! Have you ever heard of anyone sitting up at night to watch me cover a whole window with beauty? Why, man, it's the most glorious and difficult art in the world, covering a window. You look at this one when you get up in the morning. Look at all its stars and mazes and little white leaves. Look at them under a magnifying glass. And then, grass and trees, and paths and roads—all in one night—decorated as if a king was coming, decorated as no man, and no army of men, could do it, and nobody ever watching how it's done! When I'm at work, *all the world's asleep!*"

"I shall certainly sit up to-morrow night."

"But, mind you, you must look out that Tom Thaw doesn't come instead of me. Thaw's a low fellow."

He sprang up, suddenly, exclaiming: "I believe he's stirring now! I think I hear him! Good-night, my friend." And, flinging open the window, he vanished into the night.

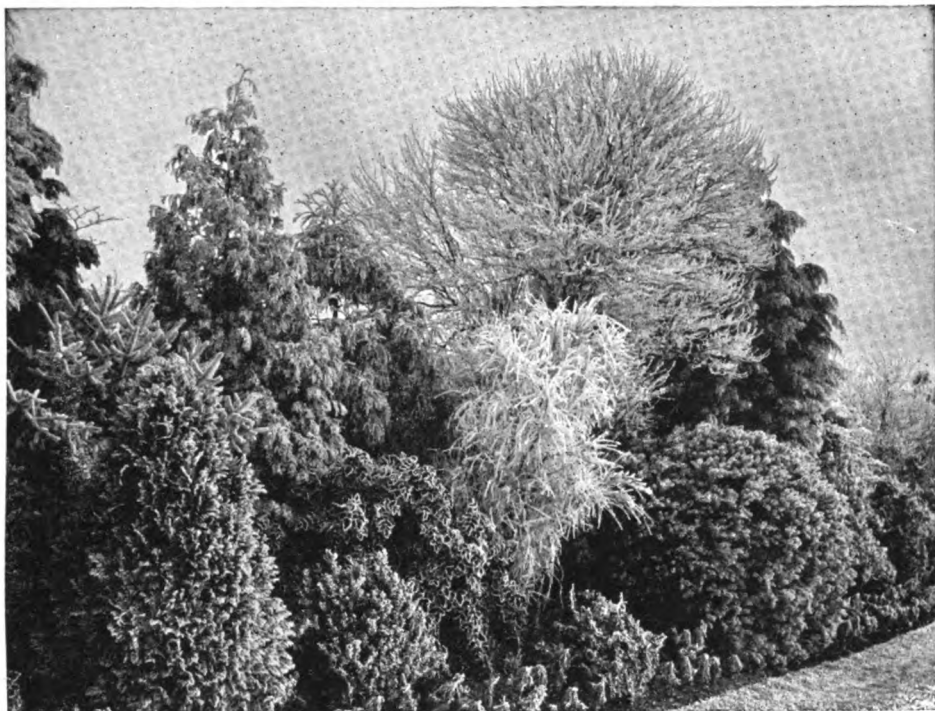
In the morning I saw how beautiful was his work. Every tree sparkled with a pure glory. The whole hillside glistened under a white veil of exquisite loveliness, and the windows of the inn were crusted with beauty, each pane a picture showing the real genius and wonderful touch of Master Jack Frost.

The next Familiar Things are on page 5003.

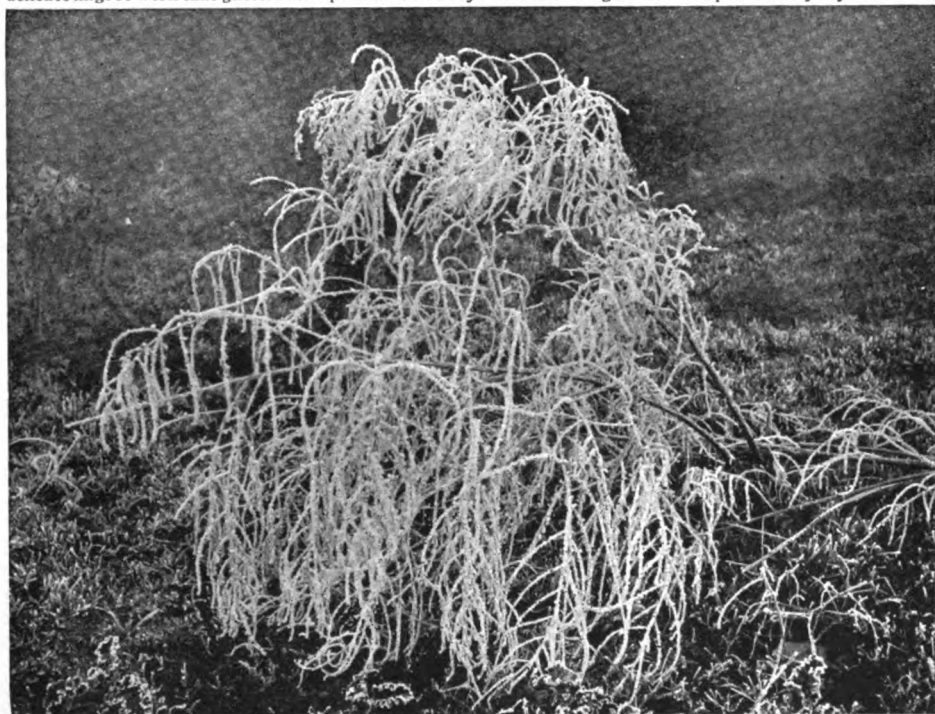




## PICTURES IN JACK FROST'S FAIRYLAND

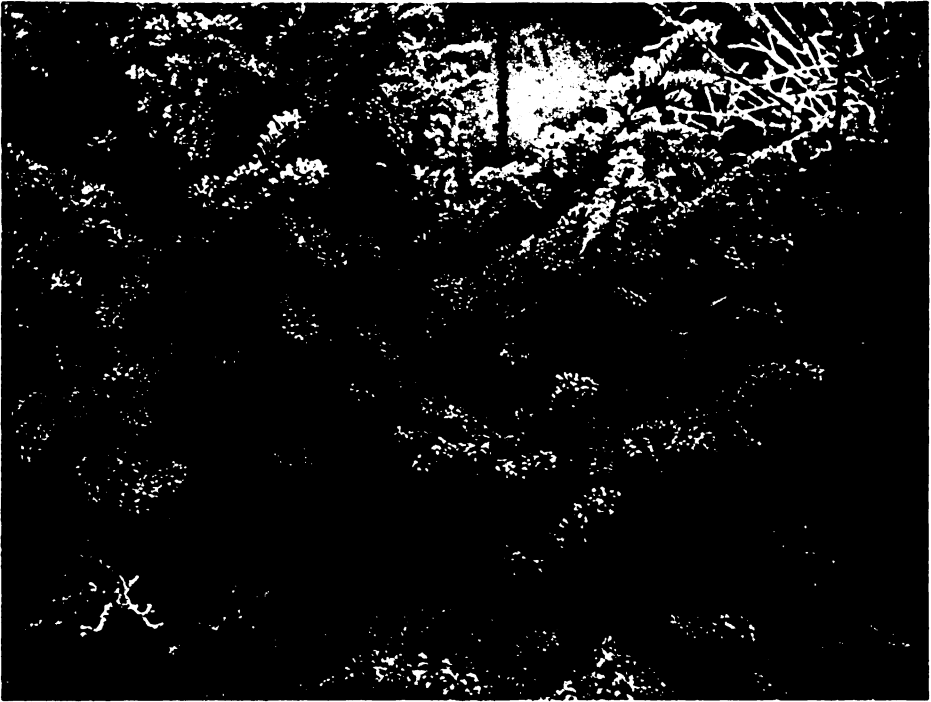


Very beautiful is the work of the frost in transforming the trees and shrubs of our gardens into a miracle of delicate filigree work that glitters and sparkles as the rays of the morning sun strike upon the tiny crystals of ice.

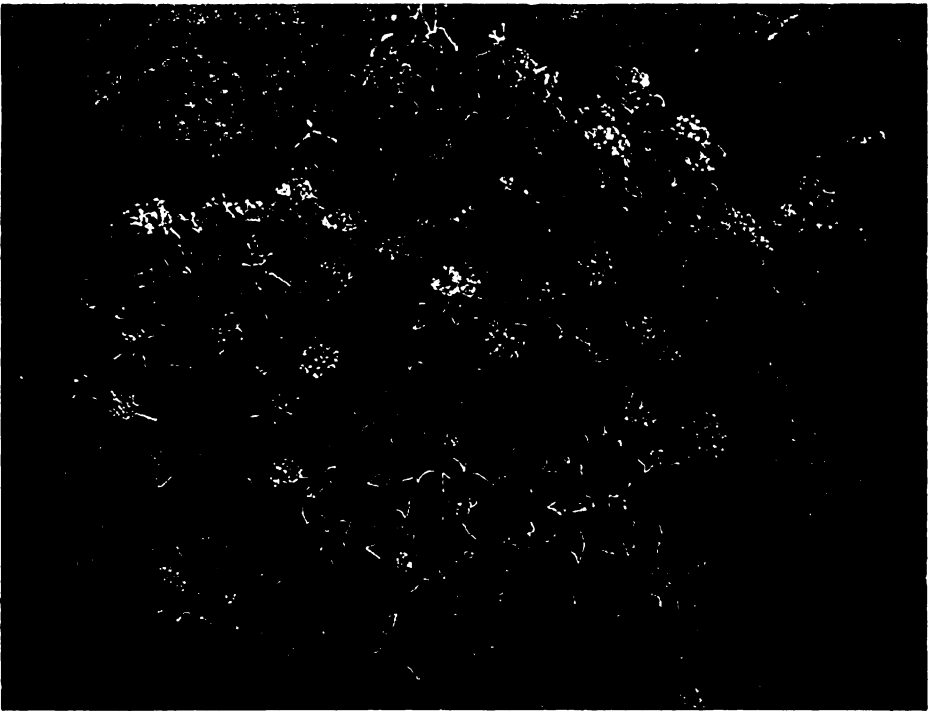


A tangled mass of twigs and branches, however dead and dull, becomes like a silver fountain, or a mass of fairy swansdown, when the hoar-frost has come like some cunning craftsman and touched it with its magic finger.

## THE MAGIC TOUCH OF THE FROZEN DEW

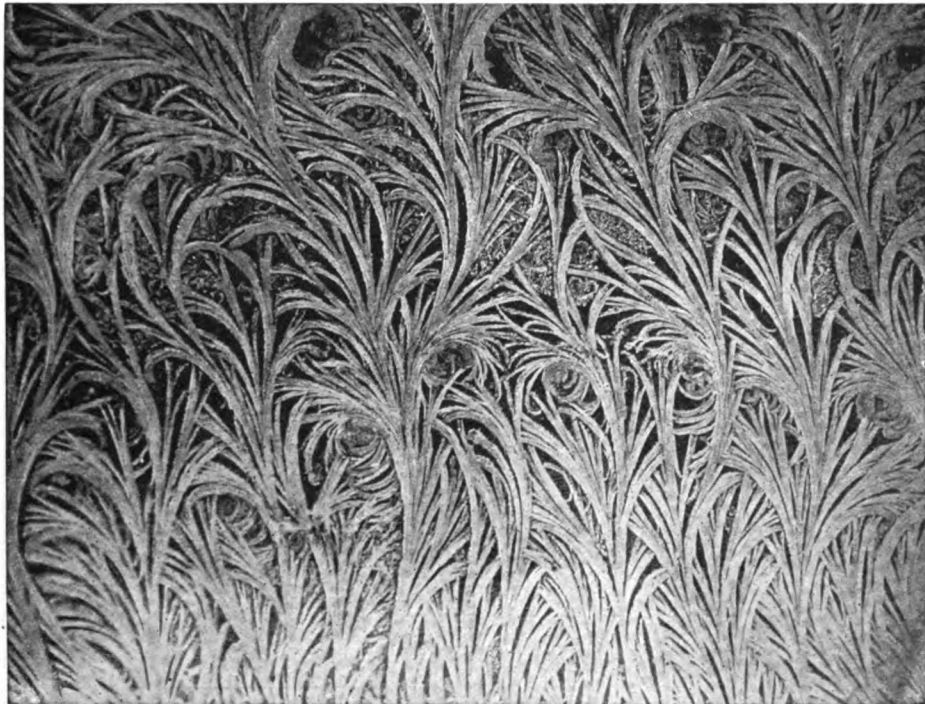


The spruce fir, the Christmas-tree of our nurseries, is always graceful to look upon, but when every branchlet and needle is covered with the glistening crystals of frozen ice, the tree becomes a vision of loveliness.

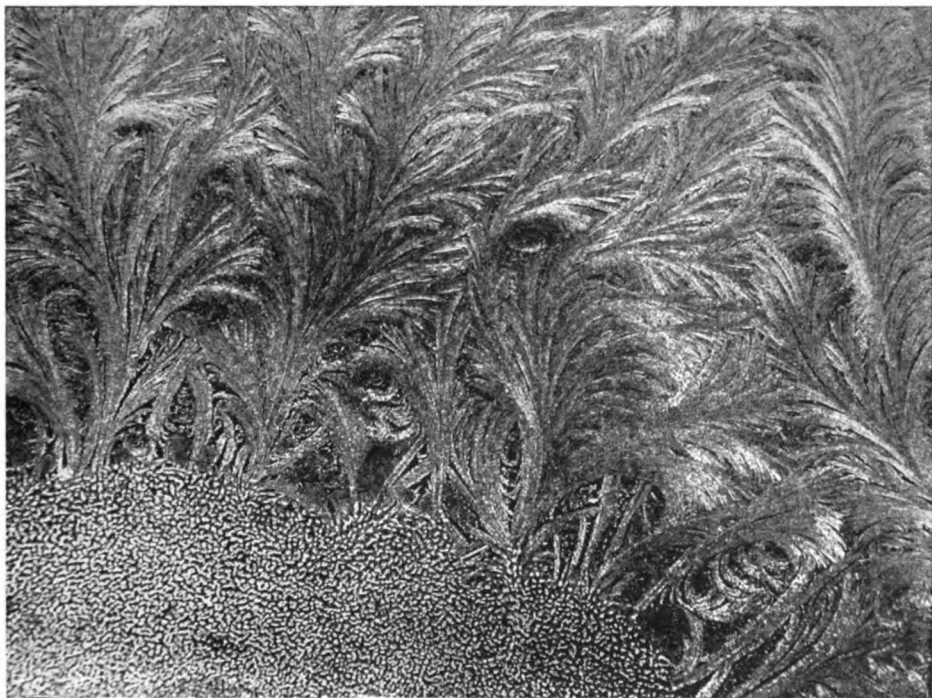


After a slight hoar-frost we may easily trace the veins and margins of every leaf by the fantastic fringes of silvery white crystals that settle on these hard parts of the leaf, while the softer, warmer parts are merely wet.

## THE FROZEN VAPOUR ON THE WINDOW

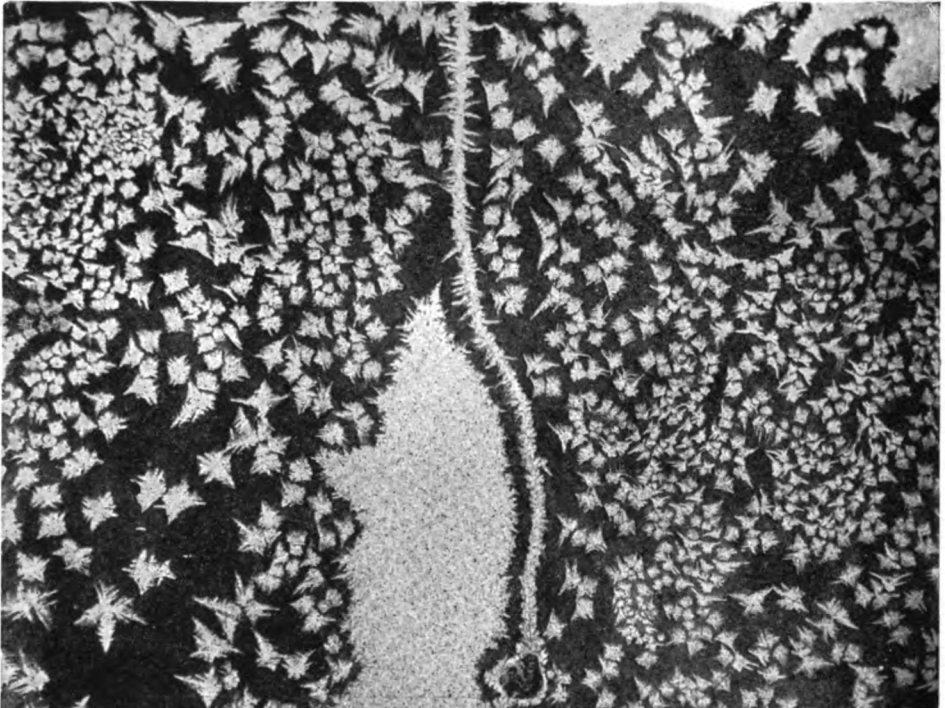


Not less beautiful than the hoar-frost out of doors is the delicate filigree-work traced on the window-pane indoors. It takes a variety of dainty forms, like natural objects. This example is remarkably like seaweed.

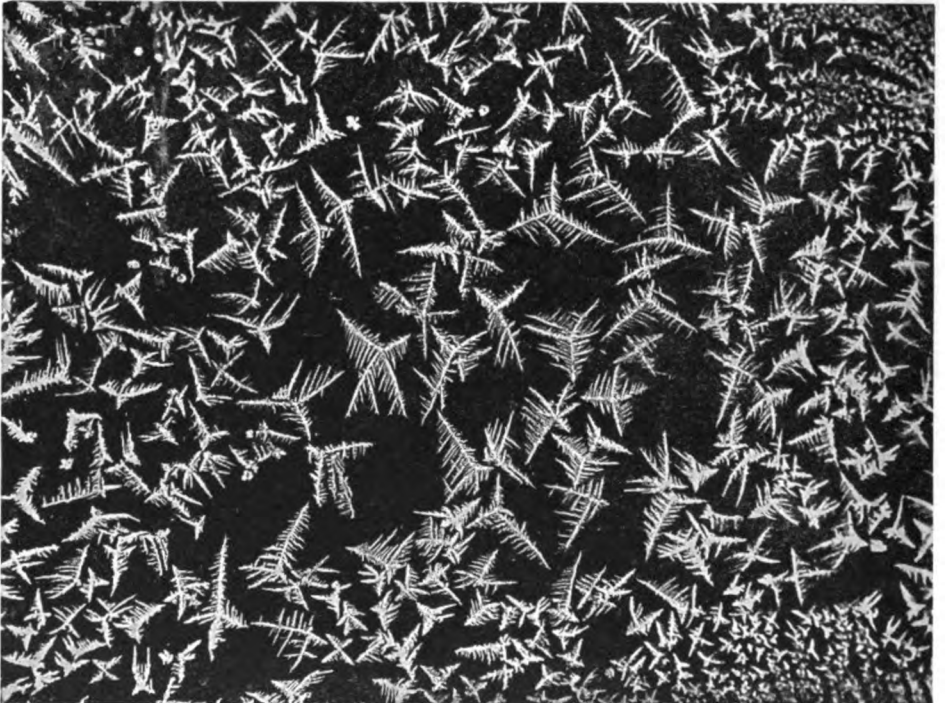


Sometimes the frost draws even more beautiful patterns than that shown in the picture above. As the moist air in the room strikes the cold glass of the window it is frozen into forms like the most delicate feathers.

## FROST PICTURES OF FLOWERS AND FERNS



The particular forms that the frozen moisture on the window-pane assumes depend largely upon the currents of air near the glass. Here, on each side of a long spiky stalk, we see a mass of what seem to be tiny blossoms.



On this window-pane the fancy of Jack Frost has taken another, though similar, direction to that shown in the picture above, and we have a wonderful collection of dainty little fern-leaves, varying in size and shape.



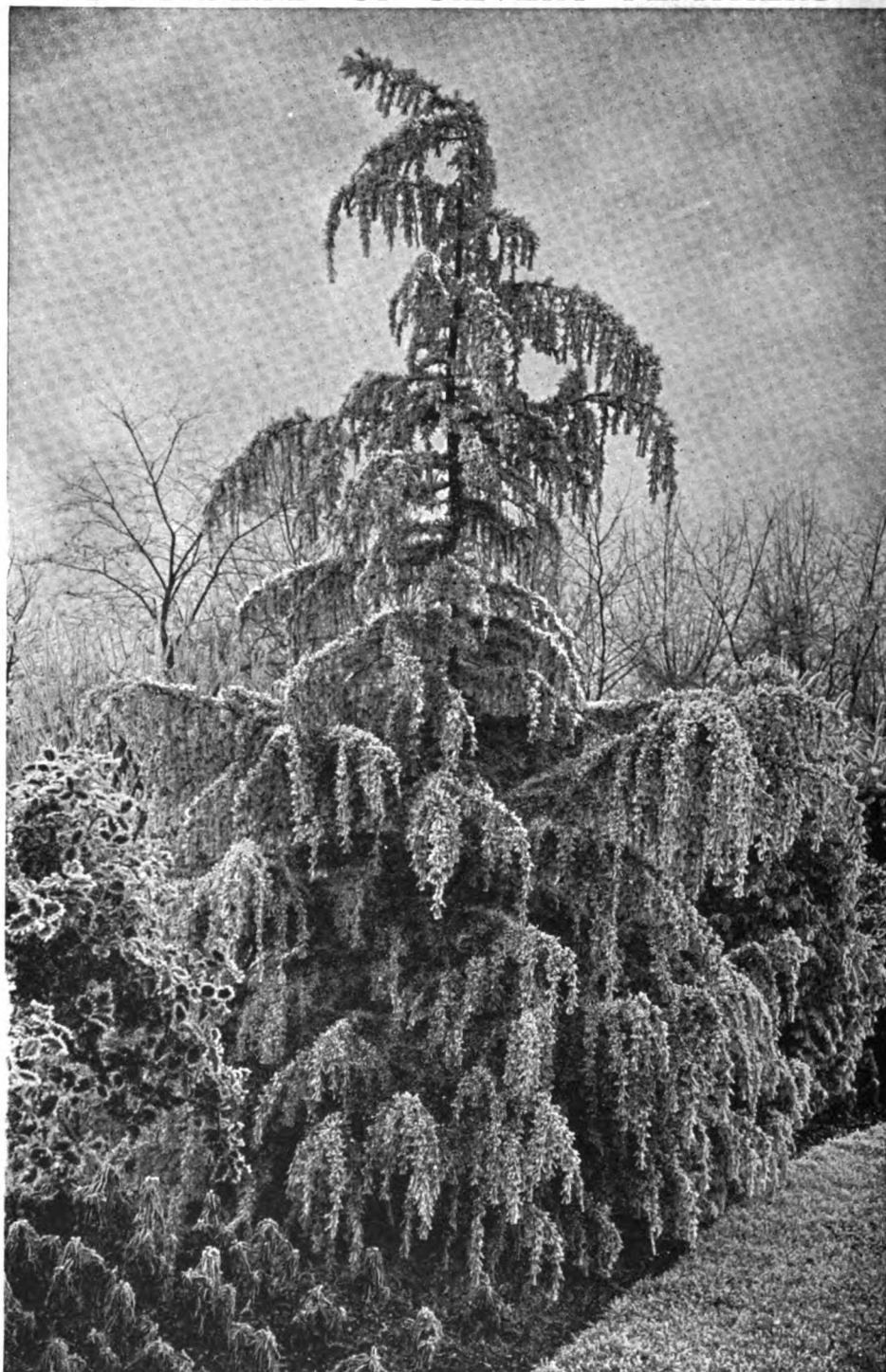
## A FIR-TREE LIKE A CORAL OF THE SEA



The myriad tiny crystals of sparkling white that cover this fir-tree in every part give it the appearance of being a mighty coral from the ocean-bed. Every branch, and leaf, and needle seems to be most delicately sculptured, and the beauty of this dazzling monument rivals the finest work of those little creatures that build up the coral islands of the Pacific. The beauty of such a crystal-covered mass needs to be seen to be appreciated.

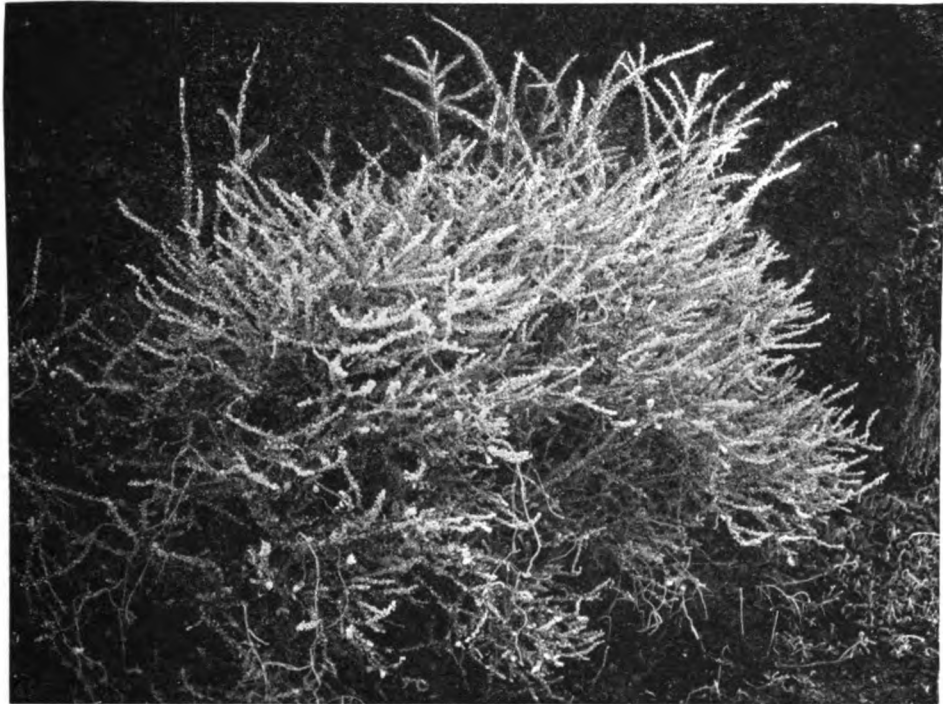
The photographs on these pages are by Mr. James Leagbeater and others.

## A PYRAMID OF SILVERY FEATHERS

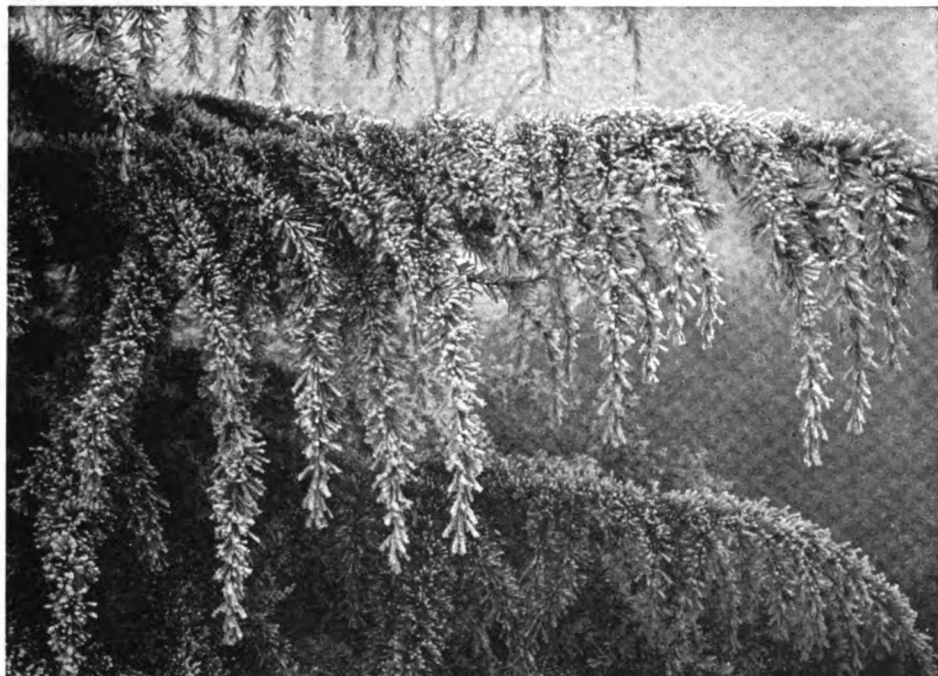


There is nothing commonplace about hoar-frost. It covers all the trees and plants with its jewelled mantle of dazzling white, and yet in no two cases is the result the same. Snow may cover the face of the earth till all things wear a uniform dress, but not so the frost. This cedar, like a pyramid of silvery feathers shining in the morning sun, was taken in the garden of one of the Editors, as were all the trees in these pages.

## A BUSH OF SPARKLING DIAMONDS



Nowhere is the work of the frost more effective and pretty than in the handling of those bushes and plants that have a mass of thin branches and twigs ; even the slightest stalk seems to grow into a band of sparkling diamonds.

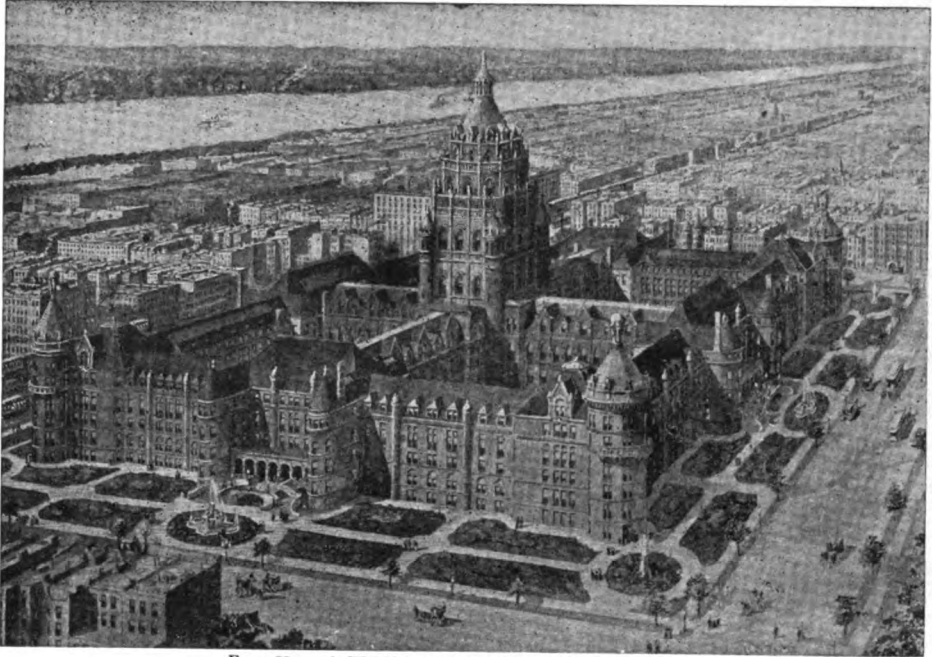


A closer view of the frosted cedar which we see on page 4898 does not destroy the illusion. These drooping branches, covered with glistening white, seem to be the tail feathers of some gigantic and beautiful bird of paradise.

THE NEXT PICTURES OF FAMILIAR THINGS BEGIN ON PAGE 5003



# THE WONDER HOUSE OF NEW YORK



From Harper's Weekly, copyright, 1897, by Harper and Bros.

This is a picture of the Natural History Museum of the City of New York as it will be when it is all completed. At present, although the whole block of property belongs to the Museum, only the front and the left and centre wings have been built. The exhibit of archaeological and natural history objects is perhaps the finest in America, and whole weeks could be spent with profit in studying the collections formed here.



Here is the hall containing exhibits of the archaeology of Mexico and Central America. Many of these great stone monoliths which we see here were found on the sites of the ancient Maja towns of Honduras, buried in the undergrowth of dense tropical forests. On these shafts of stone we see the prehistoric picture records that tell us of a people that inhabited America long before the advent of Christopher Columbus.

## A VISIT TO THE MUSEUM OF NATURAL HISTORY, NEW YORK CITY

**W**E are going to pay a visit to the Museum of Natural History to-day. We enter the building by the ground floor and after checking our hats and coats and all unnecessary parcels we pass on into the large oval entrance hall, where there is a fine collection of stone and iron meteors and meteorites.

### AMERICAN INDIANS

From the Entrance Hall we pass into the room to the left, where we find the exhibition of the Indians of the plains. Here is a real Indian tepee and many groups of life-sized Indians, so fierce and savage looking that it turns us cold even to look at them. What must the poor settlers of our country have felt in those days when, barricaded behind forts and stockades, they lived in mortal terror of a horde of such savages descending upon them in their war-paint and armed with such primitive yet deadly looking weapons as we see exhibited in the cases? The tomahawks and the long, stone-headed war clubs would prove fearful weapons of torture when wielded by such merciless hands. In another of the cases we see two scalps — one, with four soft brown braids, perhaps belonging to a little girl slaughtered in one of the long ago Indian raids.

One little group of Indians is particularly interesting. It shows two warriors on the war-path. They have killed a buffalo and are hiding in the shelter of a bank while they cook their supper. Some raw buffalo steaks are lying on the ground, and one of the Indians is heating some stones while another is stirring in a skin a savoury mess made of blood and water and bits of meat. When the stones are hot they will be dropped into the stew and thus cook it. In still another case, where the food of the Indians is

shown, it is said that grasshoppers and locusts are gathered in quantities and either roasted or dried and so eaten; not very appetising dishes, we think, yet the Indians found them good and nourishing food.

In one of the exhibition cases we see queer saddles and papoose baskets and soft buffalo-skin moccasins; in another, skin garments finely worked with beads and dyed porcupine quills, and we wonder that savage, untaught fingers should be so skilful. In still another case we see the awful looking head of a "medicine-man," painted a bright mustard-colour, with crescents and dots of indigo blue on his cheeks and chin and forehead. The card attached to the case tells that this is but one of his many methods of decoration.

Some of the masks used by the Tadi-gon-sa, or False Face Society of the Iroquois, are shown. This secret society was supposed to be connected with the powers of healing, and was very important. Some of the ceremonial usages are said to continue to the present day. One has a suspicion, however, that no matter how benevolent the purposes of the society may have been, the appearance of half a dozen figures wearing such masks could be more surely counted upon to kill than cure.

Beyond the first room of American Indians we find an exhibit of beautiful basketry, and some crudely painted pottery, which, however, is not to be compared with the exquisitely wrought baskets.

### ESKIMO INDIANS

In the Central Hall we see the Eskimo Indians, shown in their native surroundings of the cold northland. The Eskimos on the whole are a far more amiable looking lot than the fierce

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looking warriors of the plains; and yet some of those shown in the great Haida canoe look as bloodthirsty as any of the savages of the more southern parts of the country. The Haida canoe is a great boat said to have been carved by the Indians of British Columbia out of the solid trunk of one tree. It is over sixty-four feet long and eight feet wide and is curiously carved with strange devices. The wooden figure on the prow is a cross between a dog and a frog and is very evil looking. In the figures of the British Columbian Indians shown in the boat we can see a strong resemblance to the Chinese, and we remember the theory of the origin of the American Indians, — that they are said to have immigrated from Asia by way of the peninsula that once joined North America and Asia together.

In the Eskimo room we are very much interested to see two of the sleds used by Captain Peary on his last expedition to the North Pole, one of which is said to have been made by an Indian, who afterward died, and because the other Indians refused to touch it, Commander Peary was forced to handle it himself. Eight dogs were used to draw each of these sleds. The models of the Eskimo villages and camps are among the most interesting things in the museum, and there are several groups of Eskimo women, cooking and fishing, etc., that are very realistic. On the walls of the Eskimo room are some fine scenes from the land of the midnight sun.

#### THE TREES OF NORTH AMERICA AND THE AGASSIZ ROOM

We leave the Eskimo exhibit, and crossing the entrance hall enter the hall to the right, where specimens of the trees of our North American continent are shown. From here we pass on to the Agassiz Room, or the Hall of Invertebrates. In the cases of enlarged amœba, spun from beautiful wrought glass, we see some of the most delicate and fascinatingly beautiful models in the building. Some of these models are the size of a man's hand, yet with pale tinted tendrils almost as fine as a hair, which in their natural size can hardly be seen with the naked eye. Here in this

Hall of Invertebrates we see, too, models of sea-anemones, starfish, crabs, sponges and bits of the ocean-bed, shown exactly as they appear hundreds of miles below the surface. Here, too, can be seen the development of the malarial mosquito, or stigomina, from the tiny, almost invisible larva, to be found in the fresh-water ponds, to the annoying little insect that makes our lives miserable on hot, summer nights. It is most interesting to learn that it is only the female mosquito that sucks blood, for the male mosquito lives mainly upon the juices of fruits. In another case we see the poisonous effect the malarial germ has upon the tiny red corpuscles of the blood, about which we read in another part of this book.

In the Agassiz Room we also see a huge cross section cut from a California redwood tree. This tree is over 1340 years old and dates back to 550 A. D. Another interesting model is a huge squid or sea octopus done in papier maché. It is life size and is the exact reproduction of the one on exhibition at the old New York aquarium in 1877.

#### SECOND FLOOR

On the second floor, in the hall to the left of the elevator, we find the large stuffed animals, such as the seals, and walruses and some silly looking giraffes.

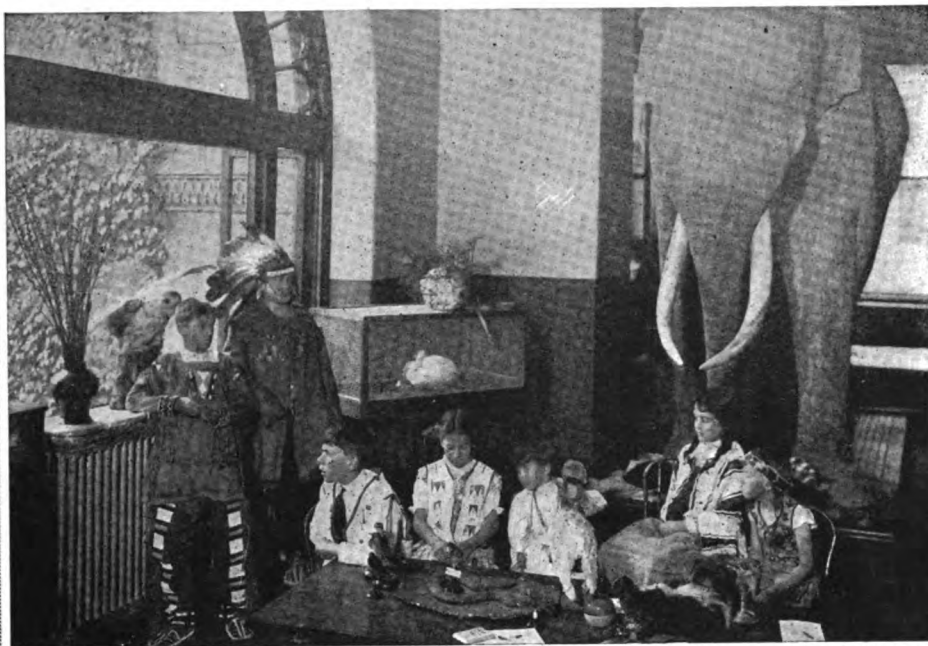
#### THE MONOLITHS OF CENTRAL AMERICA AND MEXICO

We pass on to the hall which contains the pottery and sculptures of ancient Mexico and Central America, huge monoliths all carved and wound around with strange designs and figures, that prove to us that the inhabitants of that portion of the New World were a semi-civilised people, building their own towns and erecting their own temples and monuments, long before Europeans dreamed of their existence.

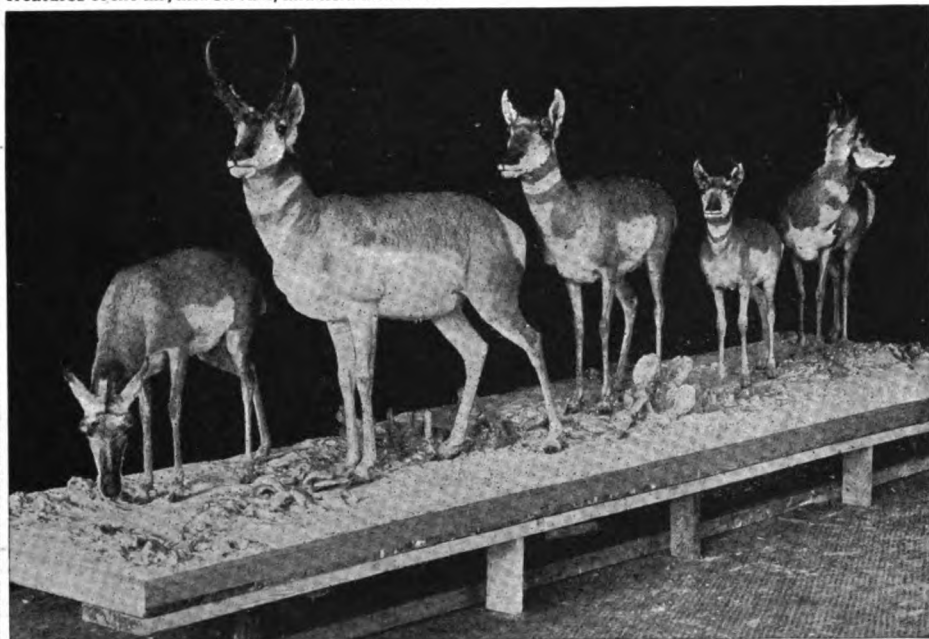
#### THE AFRICAN ROOM

In the left wing, on the second floor, is the African Room, and before we know it we have almost walked into an enormous hippopotamus which stands in the front of the room facing the door. The walls of the African Room are bristling with the heads of all sorts of wild animals: zebras, their lips curled

## THE CHILDREN AND THE ANIMALS



Every Thursday afternoon a lady gives little talks to children in a sunny, cheerful room on the second floor of the building. These children's classes have large attendances and the boys and girls are very enthusiastic over their work. Here they learn to draw and paint and model birds and animals, and to work in basketry and pottery, and bit by bit in their play-work they learn the character and the habits of the creatures of the air, and stream, and field and forest.



Here we see a group of natural, life-sized antelopes, perhaps one of the finest mounted groups in the Museum. It is from such groups as this one that the children learn the habits of the wild creatures of their country. To the little ones of the big metropolis who go very seldom into the country, the Museum of Natural History is a veritable wonder-house, flowing over with strange and delightful treasures.

back ready to bite; long-necked giraffes; mild-faced gazelles, fierce lions, lynxes, boars and curly-horned buffaloes. The cases are full of ugly looking spears and knives used by the African natives. On the whole, we gain the impression that Africa would be far more pleasant as a hunting-ground than as a place to live in. In this room there are some very good life-sized groups, showing the life and customs of the negroes, and some good paintings of native life on the window panes, which, with the light shining through from behind, give the effect of lantern slides.

In the North Wing is a general collection of birds, — birds of every kind and description, from tall, long-legged, long-necked ostriches to tiny feathered songsters not more than a finger long.

On the right side of the main hall we find the North American mammals, polar bears, great buffalo, shaggy Greenland musk-oxen, Alaskan deer, seals, rabbits, mountain sheep, and so on.

#### THE MITLA ROOM

By the time we have wandered through the rooms of the second floor, we are tired and hungry, so we take the elevator and descend into the Mitla Room in the basement for luncheon. The Mitla Room is copied from the interior of the Mitla temple in Mexico, and for those who care more for beautiful architecture than for appetite the Mitla Room is a good place to dine.

#### THIRD FLOOR

After lunch we take the elevator up to the third floor. In the room to the left of the main hall we find the smaller mammals, such as monkeys, squirrels, bats and rabbits, and also a horrible looking group of hairy orang-outangs playfully disporting themselves in the treetops of a forest in Borneo.

#### BIRDS OF NORTH AMERICA

In the North Wing on the third floor are the birds of North America, shown in their native homes. These colonies and groups of birds are very beautiful and realistic. One showing bird life on Cobb's Island, Virginia, seems so real that we almost expect to get a whiff of the salt sea air. In the foreground is

the white, shell-strewn sand, with its straight tufts of grass and the sea gulls hovering about. Beyond are the piled up clouds and the gray-blue sea, breaking in feathery lines of foam and rolling up upon the beach.

In the East Wing we see more animals, — two spotted hyænas bent upon the trail, a great silly looking brute that seems so natural that we almost expect it to put up its nose and sniff at us, — and many others that we find it hard to believe are not "real live animals." In the centre of the hall hangs a great Sulphur-bottom Whale, with eyes so very small as compared with his mammoth body that we wonder what use they can possibly be to him. He is a perfect monster, over seventy-six feet long, which looks large enough to contain a hundred Jonahs, were it not for the fact that this great creature's throat is so small that he can swallow no fish much larger than a herring.

#### FOURTH FLOOR—FOSSILS AND GEMS

On the fourth floor of the museum we find the fossils of the fearsome looking creatures that lived in North America long before man ever came upon the earth, and as we look at the fossil of the ground sloth, a huge creature measuring over thirty feet long, which is standing up on its hind legs, amiably embracing the top of a tree; and see the horrible monster lizard, the Dinosaur Brontosaurus, which is over sixty-six feet long, and which could crush a man as easily as a dog could crush a bone, — we are devoutly thankful that they vanished from the earth long before our time.

On the fourth floor also are to be seen gems of every kind and description, and crystals, crystals of royal purple, of moss-green malachite, of smoky topaz, of yellow amber and of purest gypsum.

In one room we see the exhibition of the South Sea Islands and New Zealand, and in another that of the Philippines. Both contain collections of native weapons and models of native habitations.

Altogether the Museum of Natural History is something that we cannot afford to miss in our visit to the City of New York.

## BEASTS AND BIRDS OF LAND AND SEA



This is a great, shaggy, awe-inspiring fellow, is he not? He looks so real that it almost seems as if he must be in the zoo, instead of only a stuffed skin behind a glass case in the Museum of Natural History.

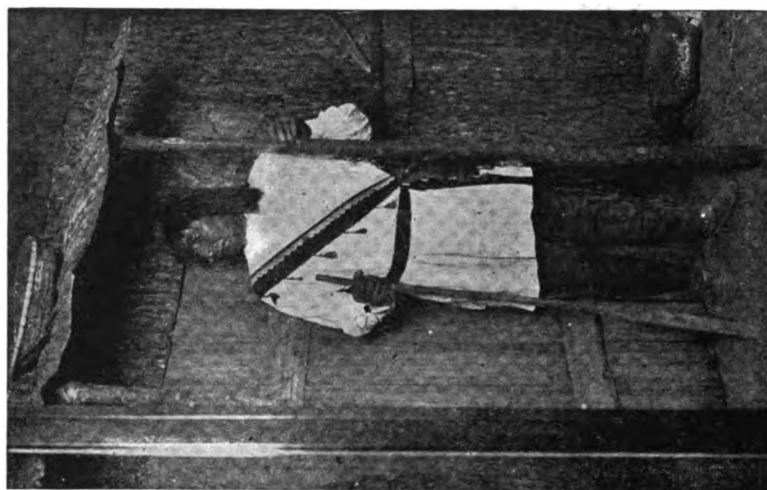
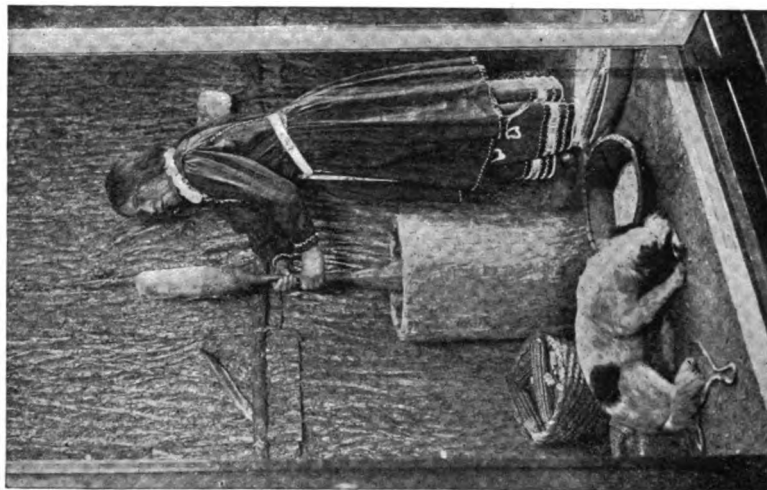
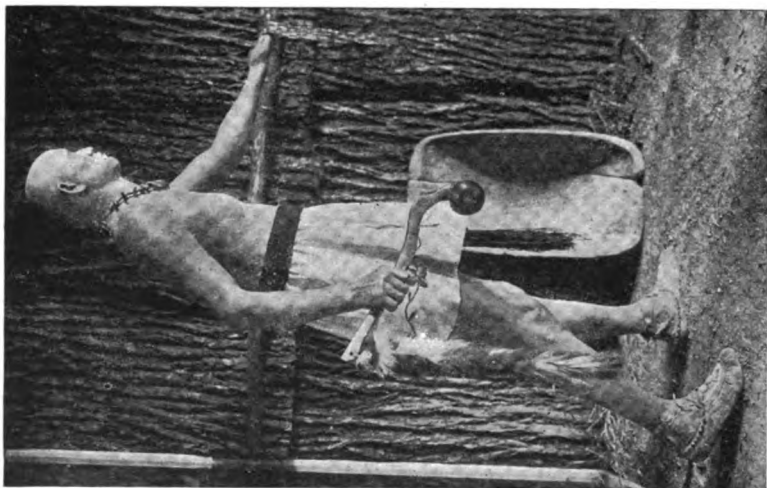


Here are a group of seals, such as you may read about in an article on the fur trade in another part of our book. If you go to the Aquarium in Battery Park you can see a whole tank full of live seals just like these.



Perhaps one of the most interesting halls in the Museum is where they have the birds shown in their natural homes. This is a scene from the Klamath Lake Bird Colony, showing white pelicans, California and Ring-Billed gulls, terns and cormorants, which all nest together on such rush islets as this.

## THE IROQUOIS INDIANS OF NEW YORK



These are the Indians who used to live in New York long before the white man set his foot upon its soil. The first picture shows a warrior, scalp shaven, club in hand, ready for the war-path. The second represents an Indian woman grinding corn to make meal from which she will bake small cakes. The dog, which we see gnawing a bone, was the only animal found domesticated among the Indians. The third figure in the group shows an Indian medicine man, or priest. It is interesting to know that this particular group of Indians was prepared for the recent Hudson-Fulton celebration in New York.





## READING

### THE STORY OF OUR NAMES

WE read on page 4751 why people came to have surnames, and how some

of the names which we bear were first of all given to our forefathers. We shall now learn something more about these surnames, and how they arose.

One way in which people got their names was, as we have seen, by being called after the place where they lived, or some particular object connected with the place, as a tree, a brook, and so on. The usual manner of forming such names in England was by the preposition *of*, as "William of Malmesbury," "Edward of York." This corresponds to the Norman *de*, which gives us so many of our French names, as "Roger de Coverley," "Simon de Montfort." It is quite easy to identify those surnames which came from names of well-known places, as York, Lancaster; but there are others not so easy, and we shall now see a few examples.

BOROUGH has given us the following names, all of which are varied spellings of the word Borough: Bury, Borrow, Burke, Brough, Burgh, Bugge, Berry, Berriman, Beer, Beare.

HAY, meaning hedge, has given us Hayes, Haigh, Haynes, Hawes, Haywood, Hawley, Hayworth, Hawton, and Featherstonehaugh, which is pronounced "Fanshaw."

GATE, often spelled Yate, gives us Yates, Byatt, which means By-gate, Woodyat, and Lidgate.

NAMES OF TREES give: Nash, which is really "atten ash," the man who

lived at, or near, the ash-tree; Nalder, atten alder; Nokes, atten oakes; Beech;

Lind and Lindley, from linden; Birks, Birkenshaw, Berkeley, all three coming from birch; Twelvetrees; Fiveashes; Snooks, which is a corruption of Seven-oaks; Ashley; Elmsley; Acland, from ac or oak; Holroyd, from holly.

Examples of this method of getting names are often found in names beginning with *at* or *by*: Attewell, meaning someone who lived at, or near, a well, Attwood, Attlee, Attenborough, Atcliffe, à Becket, which means at the little beck or stream; Bywater, Bywood, Byford, Bygate. A good exercise would be for us to take a few common words and see what surnames we can make from them: lane, brook, ford, field, croft, shaw—meaning a small wood—cliff, heath, acre. It will surprise you how many can be made up from these and similar words. A few names come from Norman towns: St. Denys gave Sidney, St. Clair gave Sinclair, St. Maur gave Seymour, and so on. Armitage is really Hermitage.

Another way in which people got their names was by being called after the office that they filled. The Church has been a great source of such names. For example: Bishop, Vick, Veck, Vicars, Vicary, Priest, Priestman, Deacon—but not Deakin, which is really Dawkin, or little David—Chaplin, Chanter, Chancellor, Clerk, Sexton, Saxton, Abbott, Prior, Friar, Frère, Canon, Monk, Pilgrim, and Palmer.

Other examples of names taken from offices are Knight, Squire, Bachelor, Bannerman, Chamberlain, Barbour, Kitchener, Ritter, Rutter, and Reuter, the last three meaning rider.

Several names are of warlike association, as Furbisher, Frobisher, Archer, Bowman, Arrowsmith, Tipper, the man who pointed the arrows, Fletcher, the man who feathered the arrows, and Stringer. What a great deal of English history these old names tell us!

Then many names come from hunting: Forester, Foster, Forster, Parker, Warner, which is short for Warrener, Woodward, Woodruff, meaning wood-reeve, Ranger, Keeper, Buckmaster, Hindman, Hunter, Venner, and Fenner, the Norman word for hunter, Fowler, and Falconer.

"Badman" is not as bad as it sounds, it is really "bede-man," bede meaning prayer, and the name meant the man who prayed on behalf of his patron or master.

Then, again, a person was called after his trade. We can think of any number of such names without trouble: Baker, Cooper, Turner, Smith, Tanner, Spicer, Tailor, Wheelwright, Chapman, Plowman, Draper, Clothier, Farmer, and so on. Here are a few that are not quite so clear:

THATCH gives Thatcher, Thacker, Thackeray. Another word for thatch, or roof, was hill or hele, and from this we get Hillier and Hellyer. So also we get Tyler from tile.

HERD, meaning the keeper of a flock, gives Shepherd, Sheppard, Stoddart, which is stot-herd, stot meaning a bullock, Calvert, meaning calf-herd, Coultard.

MILL, formerly Milne, gives Miller, Mills, Milward, Milnes, Milner, Milman.

BAKE gives Baxter, Bagster, Bullinger, and Bollinger, the last two coming from the French *boulangier*, a baker.

Then, again, there are the names which were originally nicknames. Sometimes nicknames were given on account of bodily peculiarities, and so we get Long, Short, Bigg, Little, Small, Lean, Strong, Young, Old. Sometimes "man" or "fellow" was added, and we have Youngman, Longman, Longfellow. Other compounds were made, as Armstrong, Strongitharm, Sheepshank, Cruikshank, and Lightfoot.

When people received a nice nickname they liked to keep it. That is why Bell is such a common name to-day, for it means beautiful, and Richard le Bell or Hugh le Bell would be very proud of the name. We see the same name in Belham, which is really *Bel homme*, "beautiful man," and the English word is Prettyman. But names like Gouty, Mildew, Hoggesflesh, Giddyhead, were quietly dropped.

Yellowhair has died out, but Fairfax means the same thing. Bluebeard is also dead, but there are still Redheads.

Sometimes, again, the nickname was given on account of certain mental qualities, so we have Good, Perfect, Best, Faithful, Wise, Sage, Gay, Blythe, Joyce, meaning joyous, Makepeace, Goodchild, Truman, Curtis, which means courteous, Hardy, Sweet, Doughty, Kean. The French *bon*, good, gives us Boon, Bunn, Bunker—that is, *bon-cœur*, good-heart—Bonner, and Bunyan, which really means Bon-john.

## ARITHMETIC

### DIVIDING MONEY BY MONEY

IN beginning to learn how to do compound division on page 4606, we read that the process enables us to do two things: either to divide a compound quantity into a given number of equal parts, or to find how many times one compound quantity is contained in another compound quantity of the same sort. We have been learning the first of these things, and now we shall proceed to the second, which is, perhaps, a little more complicated than the other, though it is really quite easy to do.

If we look at the lesson in simple

division which we find on page 3372, we are told that 28 marbles are divided equally among a number of boys, each boy getting 4 marbles, and we are asked how many boys received marbles. We get the answer, of course, by finding the number of 4's in 28. Now, suppose that, instead of a question about boys and marbles, we had the same sort of thing about pence and cakes, thus: "28 pence are spent in buying cakes. Each cake costs 4 pence. How many cakes are there?" Clearly, the answer may be obtained in exactly the same way as

in the case of the boys and the marbles. But suppose the amount of money, instead of being spoken of as 28 pence, had been called 2s. 4d. It is then necessary, in order to find how often 4d. is contained in 2s. 4d., to first express the 2s. 4d. in pence. Merely to divide 2s. 4d. by 4 would not give the answer to our question at all. It would simply be dividing 2s. 4d. into 4 *equal parts*, which is not what we want. We are required to find *how many times* 4 pence are contained in 2s. 4d. Our answer is a number of "times," each "time" representing one cake.

Remember, then, that in order to find the answer to our question, we must have the cost of each cake and the total cost expressed as simple quantities in terms of the *same* unit.

Consider the following example: "It takes £32 15s. 6d. to pay a number of workmen £1 8s. 6d. each. How many workmen are there?" Here, in order to keep our figures as low as possible, we may take a sixpence for the unit, and reduce each sum of money to sixpences. £1 8s. 6d. contains 57 sixpences; £32 15s. 6d. contains 1311 sixpences. On dividing 1311 by 57 we find that 1311 sixpences contain 57 sixpences 23 times, and therefore there are 23 workmen to be paid.

We should, of course, have obtained the same result if we had reduced the amounts to pence, or halfpence, or threepences, but we should have had a larger divisor and dividend in our simple division sum, and the sum to work would have been a longer one. The important point to remember in all problems of this kind is that we must reduce both amounts to the *same* units.

£	s.	d.	£	s.	d.
1	8	6	32	15	6
20			20		
—			—		
28			655		
2			2		
—			—		
57 sixpences.			1311 sixpences.		

57)1311(23 workmen.

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UNITED STATES MONEY.

When dividing money by money two things must be remembered. First, you have seen in the former lessons that we may annex zeros after the decimal point

without changing the value of a sum of money. This is one of the laws of Decimal Fractions. Second, each money unit can be divided only by a similar unit. If we want to divide \$5 into groups of 5 cents, we must change the dollars into cents.

\$ .05) \$5.00 Here we read : 500 cents  
100 divided by 5 cents equals  
100.

To make these things clear, let us arrange the following table :

\$5 equal 50 dimes, written \$5.0.

\$5 equal 500 cents, written \$5.00.

\$5 equal 5,000 mills, written \$5.000.

Bearing in mind these two things, the following examples explain themselves :

\$3) \$15 When \$15 are divided into  
5 groups of \$3, there are  
5 groups.

\$.03) \$.15 When 15 cents are divided  
5 into groups of 3 cents,  
there are 5 groups.

\$.05) \$1.50 When \$1½, or 150 cents,  
30 are divided into groups of  
5 cents, there are 30 groups.

6 Here we have dollars-  
\$15.30) \$91.80 and-cents divided by  
91.80 dollars-and-cents, so  
the work is done ex-  
actly as if the problem read : 9180 ÷ 1530.

MISCELLANEOUS EXAMPLES IN MULTIPLICATION AND DIVISION.

1. 28 boys each spend 5s. 4½d. on fireworks. How much do they spend altogether ?

2. What will be the cost of 58 pairs of boots at \$4.30 a pair ?

3. 8 persons on a holiday spend £61 14s. 8d. If they share the expense equally, how much must each pay ?

4. If it costs \$6.398.60 to make a road 23 miles long, how much does each mile cost ?

5. How many times is 2s. 7½d. contained in 175 guineas ? A guinea is, of course, 21 shillings.

6. How many yards of cloth, worth \$.60 a yard, must be given in exchange for 120 yards, worth \$.87 a yard ?

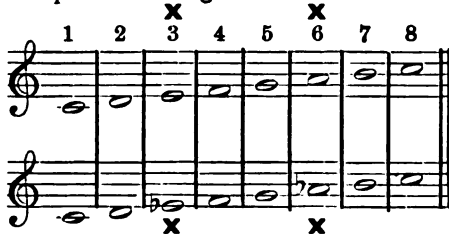
7. A man earns £500 a year—365 days. If he spends £1 4s. 3½d. a day, how much will he have saved at the end of the year ?

8. A servant's wages are £14 6s. a year. How much ought he to receive for 9 weeks, reckoning a year to be exactly 52 weeks ? For how many weeks will £4 13s. 6d. pay his wages ?

## THE FAIRIES AND THE KIND GOBLINS

THE fairy ladder of song which we are going to discover now has a sweet, sad sound, for the fairies E and A have been seized with a great longing for the fairy glens, and their kind little goblins, E♭ and A♭, have come to their rescue, and are singing for them. But they were so sorry to see the little fairies sad for one single moment that their own little voices have quite a plaintive tone.

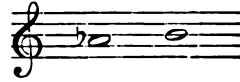
This ladder of sound begins on C, and as the fairies are very anxious for us to know, and really *feel*, the difference between the major scale of C and this scale we are now thinking about, we have pictures of both, one above the other, so that we can compare them together.



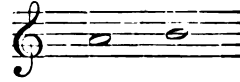
This shows us that only two notes are altered—the third and the sixth. Instead of Fairy E's voice we hear her little goblin, E♭; and we have Goblin A♭ instead of Fairy A. This means that the third from C to E♭ is a lesser third than the third from C to E, and the sixth from C to A♭ is a lesser sixth than the sixth from C to A. We have already found that C to E is a major third, so the scale starting on C with this particular major third is called *C major*. C to E♭ is a *minor* third—a third because we still consider three letters, C, D, and E; a minor or *lesser* third because there are three semitones instead of four. So the scale starting on C with the minor third from the keynote is called *C minor*—the scale with the lesser third. There is another peculiarity about this scale, and if we want to find it we must walk up our ladder, and stand on the *sixth* step, the lesser or minor sixth from the keynote. In the major scale of C, and in all major scales, we find a major second between the sixth and seventh degrees.

Now we have come to the sixth step of

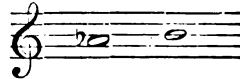
this minor scale, we see we have a longer step to take when we wish to move on to B:



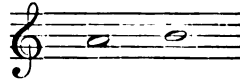
One semitone bigger than



We know that our fairy friends have a name for everything, and this big interval has quite an important title, it is called an *augmented second*—a second because two letters are involved, A and B; augmented because this particular kind of second is *one semitone greater than a major second*. An augmented interval is an enlarged interval, so as this particular second



contains three semitones, one semitone more than the major second,



it is called an augmented, or enlarged, second. Therefore, we have discovered that this ladder starting on C has, in addition to the *minor third* from the keynote, and the *minor sixth*, an *augmented second* between the sixth and seventh degrees, for the minor scale, like the major, may only have a semitone between the leading note and the keynote, the seventh and eighth degrees, and the walk from A♭ to B is necessarily bigger than the walk from A to B. These scales, *C major* and *C minor*, show where the semitones occur in both:



Here the semitones come between the third and fourth and seventh and eighth notes.



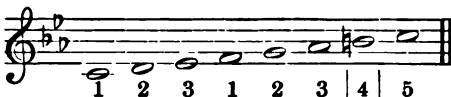
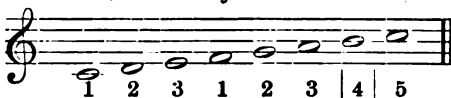
In the example at the bottom of the previous page, the semitones occur between the second and third, fifth and sixth, and seventh and eighth degrees, with an augmented second between the sixth and seventh notes. This kind of fairy ladder is called the *harmonic minor scale*. Harmonic is a difficult word, but the fairies say it means that they will use this form of the minor scale when they talk to us about harmony, or the arrangement of two or more sounds together, in the days that have yet to come. Then, again, because this minor scale of C starts on the same note as the major scale of C, the fairies look upon them as first cousins, and C minor is called the *tonic minor* of C major, and C major is described as the *tonic major* of C minor, because they have the same *tonic* or *keynote*.

What about our key-signature? C major consists of seven natural notes, so the goblins do not hang out their flags. But a minor scale has always *three sharps less, or three flats more*, than its tonic major, and, bearing this little rule of fairyland in mind, C minor has a key-signature of *three flats*. The fairies do not want to say very much about this until they have told us one or two other secrets, but they have whispered that the three flats are B♭, E♭, A♭, and here are the kind little goblins' banners:



In the treble clef, B♭ is on the third line, E♭ in the fourth space, A♭ in the

second space. In the bass clef, B♭ is on the second line, E♭ in the third space, and A♭ in the first space. In the scales containing flats, we must notice that the fairies like us to begin with B♭, and then to proceed by perfect fourths. Hence we have B♭ followed by E♭. The next new flat will be A♭, and so on. The fingering of C minor is exactly the same as in the scale of C major, so, for the last time, here they both are:



The fairies want us to make pictures of these same scales in the bass clef for ourselves, remembering that the fourth finger of the left hand must find its home on the second note of both scales. The fourth finger of the *right* hand must be placed on the seventh note of the scale, and in this scale of C minor we have to put a *natural* against the seventh note, B, because we must have the tiny step of a semitone between the seventh and eighth degrees. After Fairy B had started for a game of play with the sunbeams, she thought of this, and came back again quite cheerfully at the last moment, because, as we all know very well, the fairies always and every where put duty before pleasure.

## LA CHATTE ET LE PERROQUET

This story of the Cat and the Parrot is given in English on page 294

MADAME THÉOPHILE était une chatte jaune dont l'écrivain français, Théophile Gautier, nous raconte cette charmante-histoire :

Elle avait le ventre blanc, le nez rose et des yeux bleus ; on l'appelait Madame Théophile parce qu'elle vivait avec moi en excellents termes, dormait au pied de mon lit, rêvait sur le bras de mon fauteuil tandis que j'écrivais, me suivait au jardin, assistait à mes repas et même, parfois, s'emparait d'un peu de la nourriture que je portais à ma bouche sur ma fourchette.

Un jour, un de mes amis, qui allait

s'éloigner pour quelque temps, me confia son perroquet. L'oiseau, se sentant transporté dans un lieu étranger, s'éleva, au moyen de son bec, jusqu'au sommet de son perchoir et là, silencieux et tremblant, il roulait des yeux pleins d'alarme.

Madame Théophile n'avait jamais vu de perroquet, et cette créature étrange lui causait évidemment une surprise immense. Immobile comme un chat d'Égypte momifié, elle contemplait l'oiseau avec un air de méditation profonde, rassemblant toutes les notions d'histoire naturelle qu'elle avait pu

acquérir sur les toits, dans la cour et dans le jardin. L'ombre de ses pensées traversait ses yeux clignotants, et j'y pouvais lire, aussi clairement que si elle eut parlé, ce résumé de ses observations :

"Décidément, cette créature étrange ne peut pas être une poule verte !"

Étant arrivée à cette conclusion, la chatte descendit de la table où elle avait établi son observatoire et alla se tapir dans un coin de la chambre, le ventre à terre, les épaules en avant, la tête basse, le dos courbé—ainsi qu'une adroite panthère guettant des gazelles venues de chez elles pour se désalterer dans un lac.

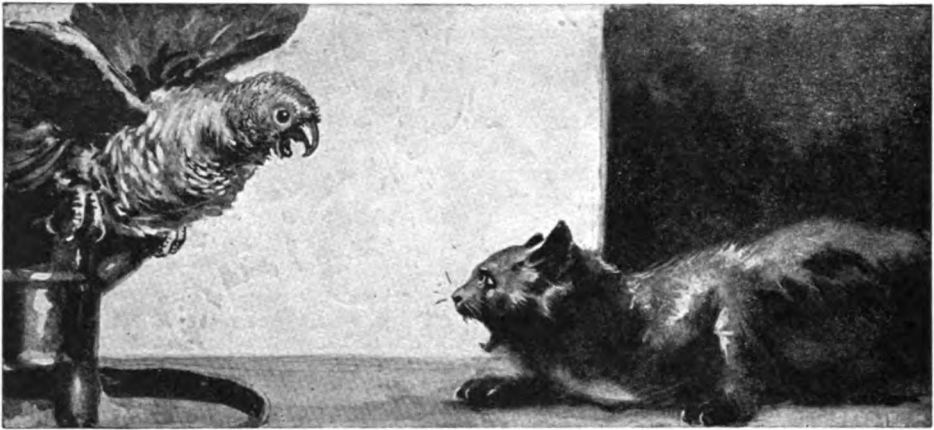
Le perroquet suivait ces mouvements avec une anxiété fiévreuse ; il hérissait ses plumes, agitait sa chaîne, levait sa patte tremblante et aiguisait

qu'elle allait faire. Ce plat étrange, si nouveau pour elle et pourtant si tentant, excitait son appétit.

Soudain, son dos se plia comme un arc tendu, et d'un bond élastique, elle atteignit le pied du perchoir. Le perroquet, comprenant le danger, s'écria tout à coup, d'une voix lente et solennelle :

"As-tu bien déjeuné, Jacquot ?"

Cette phrase causa à la chatte une terreur indescriptible et elle bondit en arrière. Une sonnerie de trompettes, un effondrement d'assiettes et de plats, un coup de pistolet à ses oreilles, n'auraient pu lui causer une terreur plus folle. Toutes ses idées sur les oiseaux étaient renversées. Son visage exprimait clairement sa pensée affolante :



Le perroquet, comprenant le danger, s'écria, d'une voix lente et solennelle : "As-tu bien déjeuné, Jacquot ?"

son bec sur le rebord de sa mangeoire. L'instinct lui disait qu'un ennemi préparait quelque mauvais coup.

Quant aux yeux de la chatte, fixés sur l'oiseau avec une intensité fascinante, ils disaient, en un langage que le perroquet comprit parfaitement, et qui n'avait rien d'incertain :

"Quoique verte, cette poule doit être bonne à manger."

Je suivais cette scène avec intérêt, prêt à m'interposer si l'occasion le demandait. Madame Théophile s'était rapprochée du perroquet ; son nez rose palpitait, elle fermait les yeux à-demi, ouvrait et fermait ses griffes. De petits frissons courait le long de son épine dorsale ; comme un gourmand assis devant un poulet truffé, elle se délectait à la pensée du repas succulent et rare

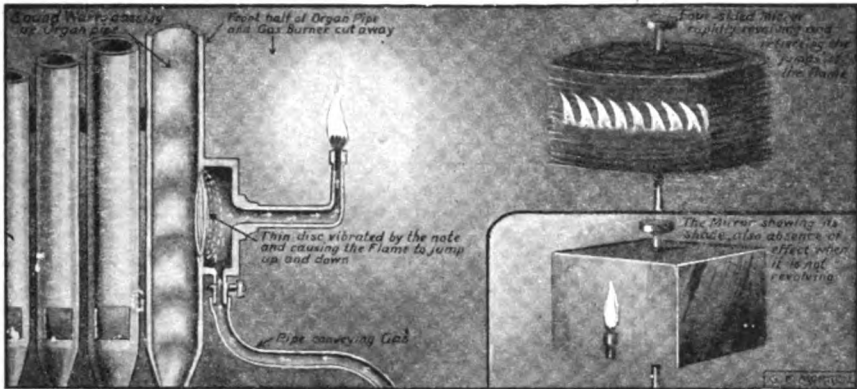
"Ce n'est pas un oiseau ; c'est un monsieur. Il parle !"

Le perroquet alors se mit à chanter, avec un grand éclat dans la voix qui était assourdissant, car il avait compris que la frayeur causée par sa parole était son meilleur moyen de défense.

La chatte me lança un rapide regard d'interrogation, et, ma réponse ne la satisfaisant pas, elle s'enterra sous le lit, d'où il fût impossible de la faire bouger, de toute la journée.

Le lendemain, un peu plus courageuse, Madame Théophile, s'enhardit à faire une autre attaque timide, mais avec le même sort que la fois précédente.

D'à partir de ce moment, elle renonça à la lutte, et considéra l'oiseau vert comme un homme qui devait être traité avec respect.



This picture shows what are known as Koenig's flames. A gas-flame is made to jump by the vibrations of a disc, set in motion by the sound waves of a musical note or notes. A four-sided mirror is kept revolving, and in this the jumping flame is seen as a succession of tongues.

## THE BEHAVIOUR OF A SOUND

WE often speak of the colour of the voice, or we say that a singer uses a very white tone, meaning by that a tone which has very little colour in it. The singer is not using his resonators—about which we read on page 4076—to give colour to the tone, but is letting it come from his vocal cords almost unchanged. Sometimes, also, we talk about the tone of a voice or an instrument as being cold or warm; or we make a comparison with the feel of things, as when we say that a voice is rough, or harsh, or smooth.

We must always remember that this is quite distinct from mere loudness. It is possible to speak or sing harshly without making much noise, and to speak quite loudly to a number of children, or to sing loudly, and yet have the tone soft, smooth, sweet, and warm. These terms of comparison are interesting, because they show how we are apt to compare our senses and liken our sensations one to another.

Now let us go a little more carefully into the question of over-tones, or harmonics, about which we read on page 4864. We can study it very well by simply taking a single string stretched between two points over a sounding-board. That is practically

CONTINUED FROM 4864



the same as a violin with a single string. Now, everyone knows that a violin string may be sounded by being plucked with the finger, or by being bowed—that is, played with a bow—and we all know

that the kind of sound produced by bowing is vastly different from the sound produced by plucking.

This is quite apart from the length of the sounds, for a clever violinist can produce exceedingly short sounds with his bow, and yet these, though of the same pitch and loudness and length as when the string is plucked, are utterly different in quality. We know already that this difference must be a difference in the matter of over-tones, and so it is.

Our ears tell us that the sound made by the bow is far richer and more lovely than the sound made by plucking, and this is because the bowing throws the string into vibrations in little pieces, so to speak, as well as over its whole length. These partial vibrations produce the over-tones which make the richness of the sound. So here we observe that a string behaves in two very different ways, according to the two ways in which it can be made to vibrate. When a piano string or a violin string is struck or plucked, there



is produced what is called a free vibration. The string is disturbed for a moment, and then the thing which disturbs it is removed, and the string vibrates freely for a greater or less time—a long time in the case of a piano, a short time in the case of a violin.

#### WHAT THE TUNER DOES WHEN HE TUNES THE PIANO

In a piano, for instance, the strings are always meant to be played in this way, and everything is done to make the tones as rich in over-tones as possible, even though they belong to the class of free vibrations. A resonator is anything that gives back sympathetic vibrations to any particular tone, and helps to magnify the sound, as we read on page 3756. But quite apart from the question of resonators, the kind of string makes a great difference. We know that the pitch of a note depends upon the tightness of the string, which is what the tuner corrects when he tunes the piano; it depends also upon the mass of the string and upon its length.

Plainly, therefore, it should be possible to get one and the same note from a long thin string and from a short thick one, and this can actually be done; or, rather, it will be one and the same fundamental note in both cases, but there is a great difference when it comes to the question of over-tones. Then we find that, though the two strings produce the same fundamental note, it is a far more beautiful and richer note when it comes from a longer, thinner string than when it comes from a shorter, thicker one.

Everyone knows how utterly different is the sound of the bass notes of a good piano and the same notes of a cheap one. One of the chief differences is that the good piano uses longer wires for the low notes, and that is the reason why it takes up so much room.

#### WHY A GOOD PIANO MAKES BETTER MUSIC THAN A BAD ONE

Yet two pianos that are of the same size may be very different in the quality of their lower notes, and when we open the pianos we find that in the better one the longer wires have been run at an angle across the shorter ones, and so greater length has been obtained. That is what is meant when it is said that a piano is over-strung, as all

but the cheapest pianos are nowadays. The point about over-stringing is to get length of string, and the point about length of string is that this is the best way of making low notes, as long, thin strings produce far more over-tones than short, thick ones.

It is very difficult to say exactly what happens when a string vibrates and produces over-tones. We know that, in the first place, the whole string is swinging from side to side, and then it seems that, on the top of that swing, so to speak, various sections of the string—as, for instance, just one-half of it, just one-quarter of it, and so on—are also making little swings of their own, each of a certain rate, according to the length of string that is swinging, and this is how the over-tones are made. This gives us some kind of idea why it is that in a very short, thick thing like a tuning-fork we get no over-tones, while from a long, stretched, slender string we get many.

#### THE FIDDLE STRING THAT CAN BE MADE TO LAUGH OR CRY

When a string is bowed, it is made to vibrate in a different way, and in this case it vibrates only when the bow is being drawn across it, and stops immediately afterwards. It only vibrates when the bow forces it to, and so these are called forced vibrations, as distinguished from free vibrations. A string undergoing forced vibrations must really be one of the most wonderful things in the world, if we could only see what is really happening to it.

The difference between a great violinist and a poor one is about as great as can be, and this is true though the violins may be the same. The secret lies in the bowing of the great player. When he plays a single, long note, it is a single note, and yet it is many notes; he can make it cry or rejoice as he draws the bow across the string.

The reason is to be found in the extraordinary sensitiveness of a string undergoing forced vibration. Changes in what the bow does to the string, so minute that no one can describe them or define them, or say where they begin or end, or what they consist of, will utterly change the quality of the sound. The reason, of course, is that the string is vibrating in a different way, and so is producing a different set or a different

proportion of over-tones in addition to its own proper note, which does not change except when the string is stopped. And the virtue of the good violin is that the body of it is somehow so made as to respond to the behaviour of the string as sensitively as the string responds to the behaviour of the bow.

#### AN EXPERIMENT THAT YOU CAN MAKE FOR YOURSELF ON THE PIANO

There is a very interesting experiment which anyone can make with a good piano. As a rule, when we play a note on the piano, none of the other notes have much chance to sound, because the dampers are resting on them and keeping them quiet. When we hold a note down, we raise the damper.

Let us, then, hold down the following notes, not striking them, but simply raising the damper, so that if anything makes the string vibrate, it shall be free to do so: C in the bass clef, the C above that, the E, G, and B flat above that. When we have done this, let us strike loudly the low C below the bass clef, and let it go. If it is a good piano, we shall now hear a soft, sweet chord made up of the five notes which we have held down, but which we did not strike. Something has struck them, and the explanation of this is very interesting.

The first part of the explanation is that the low, long string which we did strike vibrated not only as a whole, producing the note proper to itself, but also in a number of pieces of various lengths corresponding, as it happens, to the five notes which we had previously held down. When the note is struck in the ordinary way, these over-tones can only be separately distinguished by well-trained ears, but we have made them stand out in our experiment, because we stopped the loud note when we let go the key we struck.

#### WHY THINGS JINGLE WHEN WE PLAY THE PIANO

This did not stop everything, because when the air waves that made the over-tones came each against the piano string that corresponded to the particular over-tone, that string was thrown into what is called sympathetic vibration. Other strings are not affected because they cannot vibrate at that particular rate; but sympathetic vibration means that waves travelling at any rate will set vibrating anything that can vibrate at

the same rate. This is the reason why things jingle when we play the piano. This instance of sympathetic vibration will help us to understand the behaviour of resonators, and the reason why it makes so very much difference to a violin whether it was made by Stradivarius or by an inferior maker. To begin with, we know that some things will resonate and others will not. A clock or a watch has a very different tick when laid on a hard table from what it has when put on cotton-wool; and when we want to hear a tuning-fork well, we do not hold it in the air, but we press the stem against something firm and hard.

We know that the strings of a violin without the body make very poor sounds, and it is astonishing to discover how poor is the sound of a piano string outside the piano; so also the vocal cords of animals by themselves make hardly any sound at all, and that sound is very unpleasant.

#### THE BEHAVIOUR OF A NOTE OF MUSIC OVER A PITCHER OF WATER

But this must not lead us to suppose that one resonator is as good as another. On the contrary, there are special rates of vibration to which special resonators can respond—rates to which they are sympathetic, we might say, as we saw in the case of the sympathetic vibration of the piano wires. If we take a long vessel, holding water up to a certain height, and then sound a tuning-fork and hold it over the vessel, we may find that the sound is immensely enriched and increased. If now we add a little to the water, or pour a little out, holding the tuning-fork over the vessel makes no difference in the sound, or only very little.

In this way it is possible to make various kinds of instruments, consisting of a number of resonators arranged in an orderly way. If we have little flames opposite the mouths of these resonators, the flames will flicker when the corresponding resonators are vibrating, and only then. So we can see the over-tones, in a sense, and thus can find them out, even though we may be unable to detect them by means of our ears. This is called the tuning of resonators, and the first man who really studied it was a great German named Helmholtz.

But the tuning of resonators really dates from before the days of Helmholtz, though he knew what he was doing,

and we, as we tune our resonators every day, which we do, do not know what we are doing. Wonderful though other musical instruments are, and more especially the violin, which, in the hands of great masters, can be made almost human, the voice really beats them all, and the reason is that no other instrument has ever been invented in which we can tune the resonators as we go along. As is the case with everything else in the universe, a resonator creates nothing. It only makes more conspicuous what is already there.

#### **THE WONDERFUL CORDS OF THE HUMAN VOICE**

In our experiment with the piano, the soft chord we heard really came, in the first place, from the wire which we struck; and, similarly, all the over-tones of the human voice, whether in speaking or singing, are produced by the vocal cords. The marvellous richness in over-tones of the vibrations of the vocal cords is made yet more marvellous by the fact of their extreme shortness. The vocal cords of a bass singer—say, roughly, an inch long—may rival in number and richness of over-tones a violin string many inches long, or a piano string many feet long. Of course, the fact has to be remembered that the vibrations of the vocal cords are forced vibrations, and we know that, other things being equal, forced vibrations are always richer in over-tones than free vibrations. No instrument can make music so marvellous as that of the voice.

The chest and the cavities of the mouth and nose make the resonators for the voice, and these differ from all others in that they can be changed from moment to moment, and changed appropriately. For the lower notes the principal resonator is the chest, and its use is in reinforcing the lower over-tones. It does this best when it is well expanded, and therefore a singer produces far more resonant low notes when there is plenty of air in his lungs than when the air is nearly all expelled.

#### **A GREAT SINGER'S MARVELLOUS POWER OVER LANGUAGE**

But all the different qualities of tone which decide what vowel the singer is singing, and, apart from that, control so much the quality of the voice and its effect upon our minds, are due to the higher over-tones. These are affected

by the upper resonators, the shape of which we can instantly control within such a wide range. From the practical point of view, the power of tuning our resonators is of the greatest importance, because it gives us the power of producing different vowels. Therefore, all the difference between the lowest types of human language, which practically consist of consonants only—we may almost say of nothing but clicks and snorts and coughs, if not sneezes—and the higher types of language, rich in vowel sounds, is due to the laws of resonators and the fact that we can tune our resonators as we please.

The good singer goes even farther than the highest language in this respect: he does everything that the language does, and more. It is true that the bad singer often spoils the vowels of a language, and makes them all nearly alike. By so doing he prevents us from understanding the words he sings, and he also loses all the value of the variety in vowel tones.

#### **THE MANY THINGS THAT GO TO MAKE A GOOD SINGER**

The good singer not only uses variety and makes the most of it, sounding his vowels much more purely than most of us do when we speak, but he also tunes his resonators from moment to moment, so as to make the tone cold or warm.

For this purpose he uses everything that is at his disposal for tuning his resonators. The extent to which the mouth is opened, the exact position of the lips, of the tongue, and of every part of the throat, from its roof downwards—all these modify the tuning of the upper resonators, and are under the perfect and easy control of the great singer.

It is not by any means only stretched strings that produce over-tones. The same is true of pipes, such as the pipes of an organ, a flute, a clarinet, or a bassoon. These vary very much in their quality, and the variations are due to the differences in the over-tones. In each case the column of air in the pipe is not only vibrating as a whole from end to end, but also in sections, and thus the over-tones are produced.

For the sake of curiosity we may study the behaviour of such a thing as a plate. Many years ago, careful study was made of plates clamped in the middle, and then made to vibrate by

having a violin bow drawn across the edge. If some fine sand be spread over the plate, we now notice that the sand is thrown into certain patterns, like the patterns produced by the voice, which are shown on page 4072. These patterns will change according to circumstances; as, for instance, when the bowing is done rather differently.

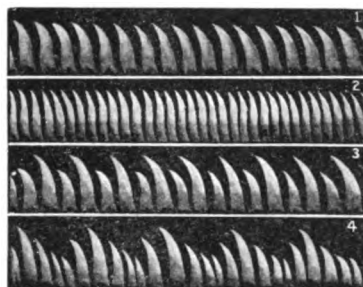
Now, we can readily understand that the sand will be thrown from the part of the plate which is vibrating most and will tend to be heaped up on the part which is moving least, wherever that may be. We find, then, that in every case there are certain definite lines upon the plate which are moving least, and on which the sand gets heaped. These points are called *nodes*, from a Latin word really meaning knots. But the importance of nodes is not only due to the fact that we find them in the case of plates. When we carefully study a stretched string, we find that there are certain places along the length of the string where it moves least, and these are the nodes. We know that the string is always moving as a whole; but, apart from that, it is also moving in pieces, producing the over-tones, and these pieces lie between the places where the nodes form. The simplest and commonest over-tone in the case of any string is, we find, one that is just an octave higher than the fundamental note.

We have already learnt the rule about the vibration of a string, that the shorter it is the quicker it vibrates, other things being equal. So when the over-tone is an octave above the fundamental tone, it must be that the string is vibrating in half its length, as well as its whole length. Half the length will mean double the number of vibrations in each second, and that will just make the octave. We should expect, then, to find a node formed half-way along the string, and so it is. Other nodes also form, corresponding to the particular over-tones in each case. Under proper conditions we can actually see these

nodes when a stretched string vibrates. Of course, in the case of very high over-tones, it must mean that the string is being cut up, so to speak, into a large number of small lengths, small enough to correspond to the high pitch of the over-tone; and this is so. The higher the over-tone the larger is the number of vibrating pieces into which the string is broken, and the smaller is the range of the to-and-fro swing of each segment.

We know that the loudness of a sound depends upon the width, or *amplitude*, as it is called, of the swing of the air waves, and that depends, of course, upon the width of the swing of the thing that makes the air waves. So, in this case, we should expect that if the swing of the pieces of the string gets smaller the shorter they are, the over-tones must get fainter the higher they are, and that

is exactly what happens. We must not allow our minds to be confused with the idea that somehow or other it is possible for any particles of air or any parts of a string to be in two places at the same time. Of course, we know that this cannot happen. So, when a string is vibrating so as to produce both a fundamental note and also several over-tones, it is not really doing



Here we see the appearance of the changes in a flame as the sound waves of different notes play upon it. In picture 1 the note played is C; in 2 it is C an octave higher; in 3 the two C's are played together; and in 4 C and E are played together as a third.

any of the things that we fancy it does, but something which is the result of all of them. No part of it can be in two places at the same time, and the actual movement of the string is an immensely complicated one. So, also, are the waves of air produced by this motion.

This becomes still more extraordinary and difficult to understand when we try to imagine how complicated must be the sound waves produced when a number of instruments and voices are all sounding together. The wave which reaches the ear is an immensely complicated sort of blend, or compromise, between all the different kinds of waves that have been produced. A very interesting way of studying sound waves is to be found in the phonograph, about which we read in another part of this book, and which was at first just a toy.

But we can make the phonograph record the waves corresponding to an orchestra or to any kind of sound, simple or complicated, music or mere noise, and the marks made upon the wax by the phonograph needle can be studied by means of the microscope, or they can be photographed, and greatly magnified.

**THE FLAME THAT DIES WHEN WE SAY OO AND JUMPS WHEN WE SAY EE**

This makes one way in which we can study sound by turning it, so to speak, into something that can be seen. We saw this, also, in the case of the flames which were made to flicker when the resonators opposite them were thrown into action. Flames can be made extraordinarily sensitive to sounds; we cannot say that the flame hears the sound, but it is somehow affected by the quality of the sound waves.

Professor Tyndall invented what he called a vowel flame, which, when nothing disturbs it, is about two feet high, but certain sounds will make it so short that it can scarcely be seen, and then, when the particular sound stops, up it will jump again. It is called a vowel flame because it can tell one vowel from another, so to speak. The flame is specially sensitive to high notes, and is therefore much more affected by vowels which are made by high over-tones than by those which have lower over-tones.

The highest pitched of the vowels is e. Anyone will agree with this who will whisper the various vowels all on the same note, and there will be no doubt that, though they are all on the same note, yet e is the highest of them all. The reason is that, though the fundamental note is the same for each of the vowels as we are whispering them, the over-tones of e are the highest. Now, if we say oo, as in boot, to the vowel flame, it will do very little; but if we say ee to it, as in feet, it will almost disappear. When we stop, it jumps up again.

**HOW MEN CAN WATCH A SOUND PLAYING WITH FIRE**

Sensitive flames can be used for more strictly scientific purposes. We have seen already that they can be made to show which of a set of resonators are being thrown into action by a certain sound. This test can be applied to the study of sounds, notably to the study of the vowel sounds, which are more numerous than may be supposed by

anyone who speaks only one language.

When we learn French we all know how different some of the vowel sounds are, and really the total number of possible vowel sounds is very large. This is all a matter of over-tones, and they can be studied by speaking into a little machine in such a way as to affect a flame, and we can study the shape which the flame takes in different cases. In fact, we may say that we can actually watch a sound playing with fire! There is a likeness between the shape of the flame in such cases and the shapes of the marks which the same sounds will make on wax by means of the phonograph.

When a wave strikes a breakwater and comes back again and meets the next wave, the two will clash and interfere with each other. At times the two crests will come together and will make a very high crest; at other times the crest of one wave will meet the trough of another, and each will tend to spoil the other. This effect of one wave on another is called interference, and it is true of all kinds of waves—water waves, sound waves, even the ether waves that make light.

**WHAT WE CAN LEARN BY THROWING A STONE INTO A POND**

If the sea and a breakwater are not convenient, we can study interference in a small way by throwing two stones into a pond, and seeing what the one set of waves does to the other.

Interference in sound waves produces a most interesting result. It means that if we have two notes sounding together that are very near in pitch, but not the same, the waves will interfere with each other, and we shall get what are called beats; the sound will seem to throb, or beat. When the two waves are helping each other, the sound gets louder; when they are spoiling each other the sound is fainter. This beat is very unpleasant.

Part of the objection to what we call discord is that the waves which are being made by the various notes are capable of interfering with each other, and so we get beats, or throbs. But different people vary very much as to what they find nice in the way of discords, and the right use of certain discords in music is invaluable because it so enormously increases the effect of the harmony upon our ears.

The next part of this is on page 5039.

# The Child's Book of POETRY

## A POEM FOR CHRISTMAS

THERE are many stories told about the birth and boyhood of Jesus for which we find no authority in the Holy Scriptures. That is to say, they are to be regarded, like many of the most beautiful stories in the world, as legends. Here, in this fine poem, Henry W. Longfellow tells a beautiful story of the homage done to the infant Jesus, and, though largely based on the Scriptural version, it is still in some ways legendary. We are told in the New Testament that certain "wise men" from the East came to Jerusalem, having seen in the heavens a bright star, which they supposed heralded the birth of the King of the Jews, foretold by the prophets of old. Instructed by the Jewish priests, they journeyed down to Bethlehem, and there, in the house where Mary and her husband Joseph lived, they did homage to the infant Jesus, making offerings of gold, and frankincense, and myrrh. To some extent, therefore, Longfellow's poem is based on the Bible story.

## THE THREE KINGS

THREE Kings came riding  
from far away,  
Melchior and Gaspar  
and Baltasar ;

Three Wise Men out of the East were they,  
And they travelled by night and they  
slept by day,  
For their guide was a beautiful, won-  
derful star.

The star was so beautiful, large, and clear,  
That all the other stars of the sky  
Became a white mist in the atmosphere,  
And by this they knew that the coming  
was near

Of the Prince foretold in the prophecy.

Three caskets they bore on their saddle-  
bows,

Three caskets of gold with golden keys ;  
Their robes were of crimson silk with rows  
Of bells and pomegranates and furbelows,  
Their turbans like blossoming almond-  
trees.

And so the Three Kings rode into the West,  
Through the dusk of night over hill and  
dell,

And sometimes they nodded with beard on  
breast,

And sometimes talked, as they paused to  
rest,

With the people they met at some way-  
side well.

"Of the Child that is born," said Baltasar,  
"Good people, I pray you, tell us the news ;  
For we in the East have seen His star,  
And have ridden fast, and have ridden far,  
To find and worship the King of the Jews."

And the people answered : "You ask in  
vain ;

We know of no King but Herod the  
Great !"

They thought the Wise Men were men insane,  
As they spurred their horses across the plain,  
Like riders in haste, and who cannot wait.

And when they came to Jerusalem,  
Herod the Great, who had heard this thing,  
Sent for the Wise Men and questioned them ;  
And said : "Go down unto Bethlehem,  
And bring me tidings of this new King."

CONTINUED FROM 494



So they rode away ; and  
the star stood still,

The only one in the grey of  
morn ;

Yes, it stopped—it stood still of its  
own free will,  
Right over Bethlehem on the hill,  
The city of David, where Christ  
was born.

And the Three Kings rode through the  
gate and the guard,

Through the silent street, till their horses  
turned

And neighed as they entered the great  
inn-yard ;

But the windows were closed and the  
doors were barred,

And only a light in the stable burned.

And cradled there in the scented hay,  
In the air made sweet by the breath of  
kine,

The little Child in the manger lay,  
The Child that would be King one day  
Of a kingdom not human but divine.

His mother, Mary of Nazareth,  
Sat watching beside His place of rest,  
Watching the even flow of His breath,  
For the joy of life and the terror of death  
Were mingled together in her breast.

They laid their offerings at His feet ;  
The gold was their tribute to a King,  
The frankincense, with its odour sweet,  
Was for the Priest, the Paraclete,  
The myrrh for the body's burying.

And the mother wondered and bowed her  
head,

And sat as still as a statue of stone ;  
Her heart was troubled yet comforted,  
Remembering what the angel had said  
Of an endless reign, and of David's  
throne.

Then the Kings rode out of the city gate,  
With a clatter of hoofs in proud array ;  
But they went not back to Herod the  
Great,

For they knew his malice and feared his hate,  
And returned to their homes by another  
way.

THE FIRST NOWELL

As we have already given a very careful selection of Christmas hymns and carols on pages 2149 to 2157, there are not many more to choose. This quaint old carol, however, is worth adding to our collection, as it is one still remembered and sung, though not so commonly as others we have given. "Nowell" is an old way of spelling Noël, which is the French word for Christmas. How comes it that this word should appear in a carol written in English? That is easily explained, for, as we know, the Anglo-Saxon speech, after England was conquered by the Normans, adopted numerous words from the Norman-French, and in the old English poetry we find many of these words. This carol, of course, is only poetry in a very crude state, and represents an effort of uneducated people in the olden times to express in their own simple way an old, old story that has touched the hearts of all mankind. It is the same story that Longfellow tells in true poetic form in "The Three Kings."

**T**HE first Nowell the Angel did say,  
Was to three poor shepherds in the fields  
as they lay ;

In fields where they lay keeping their sheep,  
On a cold winter's night that was so deep.  
Nowell, Nowell, Nowell, Nowell,  
Born is the King of Israel.

They looked up and saw a star,  
Shining in the East beyond them afar ;  
And to the earth it gave great light,  
And so it continued both day and night.

And by the light of that same star,  
Three Wise Men came from country afar ;  
To seek for a King was their intent,  
And to follow the star wherever it went.

The star drew nigh to the North-West,  
O'er Bethlehem it took its rest ;  
And there it did both stop and stay,  
Right over the place where Jesus lay.

Then did they know assuredly  
Within that house the King did lie ;  
One enter'd in then for to see,  
And found the Babe in poverty.

Then enter'd in those Wise Men three  
Most reverently upon their knee,  
And offer'd there in His presence  
Both gold, and myrrh, and frankincense.

Between an ox-stall and an ass  
This Child truly there, born He was ;  
For want of clothing they did Him lay  
All in the manger among the hay.

Then let us all with-one accord  
Sing praises to our heavenly Lord,  
That hath made heaven and earth of nought,  
And with His blood mankind hath bought.

A CHRISTMAS HYMN

This spirited Christmas hymn by Alfred Domett contrives to give a new turn to an old theme. Though the story of Christmas is a story that changed for ever the whole course of human life and thrilled the world with a new hope, so that there is a sense in which it will never grow old, it has been sung by countless poets, and he may be regarded as something of a genius who can bring a new thought to it.

**I**t was the calm and silent night !  
Seven hundred years and fifty-three  
Had Rome been growing up to might  
And now was queen of land and sea.  
No sound was heard of clashing wars—  
Peace brooded o'er the hush'd domain :  
Apollo, Pallas, Jove, and Mars  
Held undisturb'd their ancient reign,  
In the solemn midnight,  
Centuries ago.

'Twas in the calm and silent night !  
The senator of haughty Rome,

Impatient, urged his chariot's flight,  
From lordly revel rolling home ;  
Triumphal arches, gleaming, swell  
His breast with thoughts of boundless sway ;  
What reck'd the Roman what befell  
A paltry province far away,  
In the solemn midnight,  
Centuries ago ?

Within that province far away  
Went plodding home a weary boor ;  
A streak of light before him lay,  
Fallen through a half-shut stable-door  
Across his path. He pass'd—for naught  
Told what was going on within ;  
How keen the stars, his only thought—  
The air how calm, and cold, and thin,  
In the solemn midnight,  
Centuries ago !

O strange indifference ! low and high  
Drowsed over common joys and cares ;  
The earth was still—but knew not why  
The world was listening, unawares.  
How calm a moment may precede  
One that shall thrill the world for ever !  
To that still moment, none would heed,  
Man's doom was link'd no more to sever—  
In the solemn midnight,  
Centuries ago !

It is the calm and solemn night !  
A thousand bells ring out, and throw  
Their joyous peals abroad, and smite  
The darkness—charm'd and holy now !  
The night that erst no shame had worn,  
To it a happy name is given ;  
For in that stable lay, new-born,  
The peaceful Prince of earth and heaven,  
In the solemn midnight,  
Centuries ago !

MY PLAYMATE

A subdued note of melancholy tunes this poem by J. G. Whittier. It is the reverie of one who, in later life, revisits a scene made dear to him by memories of a little playmate of his early years. Time has worked great changes and taken the playmates far apart, but the old place they knew in youth is still hallowed to the one who lingers there, and has power to touch his memory with tender thoughts.

**T**HE pines were dark on Ramoth hill,  
Their song was soft and low ;  
The blossoms in the sweet May wind  
Were falling like the snow.

The blossoms drifted at our feet,  
The orchard birds sang clear ;  
The sweetest and the saddest day  
It seemed of all the year.

For, more to me than birds or flowers,  
My playmate left her home,  
And took with her the laughing spring,  
The music and the bloom.

She kissed the lips of kith and kin,  
She laid her hand in mine ;  
What more could ask the bashful boy  
Who fed her father's kine ?

She left us in the bloom of May :  
The constant years told o'er  
Their seasons with as sweet May morns,  
But she came back no more.

I walk, with noiseless feet, the round  
Of uneventful years ;  
Still o'er and o'er I sow the spring  
And reap the autumn ears.



She lives where all the golden year  
Her summer roses blow ;  
The dusky children of the sun  
Before her come and go.

There haply with her jewelled hands  
She smooths her silken gown—  
No more the homespun lap wherein  
I shook the walnuts down.

The wild grapes wait us by the brook,  
The brown nuts on the hill ;  
And still the May-day flowers make sweet  
The woods of Follymill.

The lilies blossom in the pond,  
The bird builds in the tree,  
The dark pines sing on Ramoth hill  
The slow song of the sea.

I wonder if she thinks of them,  
And how the old time seems—  
If ever the pines of Ramoth wood  
Are sounding in her dreams.

I see her face, I hear her voice :  
Does she remember mine ?  
And what to her is now the boy  
Who fed her father's kine ?

What cares she that the orioles build  
For other eyes than ours—  
That other hands with nuts are filled,  
And other laps with flowers ?

O playmate in the golden time !  
Our mossy seat is green,  
Its fringing violets blossom yet,  
The old trees o'er it lean.

The winds so sweet with birch and fern  
A sweeter memory blow ;  
And there in spring the veeries sing  
The song of long ago.

And still the pines of Ramoth wood  
Are moaning like the sea—  
The moaning of the sea of change  
Between myself and thee !

### I TRAVELL'D AMONG UNKNOWN MEN

Wordsworth was curiously fond of the name Lucy, which occurs in quite a number of his shorter lyrics. In this beautiful little poem he touches a theme that has often inspired writers of all kinds. It is only when we travel "among unknown men" in foreign lands that we realise how dear is our homeland. Lucy here is really the cherished object of our affections made individual. The poem was composed by Wordsworth in 1799, and was one of the "Poems Founded on the Affections," published in 1807.

I TRAVELL'D among unknown men,  
In lands beyond the sea ;  
Nor, England ! did I know till then  
What love I bore to thee.

'Tis past, that melancholy dream !  
Nor will I quit thy shore  
A second time ; for still I seem  
To love thee more and more.

Among the mountains did I feel  
The joy of my desire ;  
And she I cherished turned her wheel  
Beside an English fire.

Thy mornings show'd, thy nights conceal'd  
The bowers where Lucy play'd :  
And thine is, too, the last green field  
That Lucy's eye survey'd.

### THREE YEARS SHE GREW

In this very familiar poem of Wordsworth's we have yet another instance of his love for the name of Lucy. We are not to suppose that the poet is here expressing a personal experience. Indeed, this particular poem was composed in 1799, and published in 1800 among his "Poems of the Imagination," so that we may regard it as purely imaginative, but none the less essentially real in its spiritual truth.

THREE years she grew in sun and shower ;  
Then Nature said : " A lovelier flower  
On earth was never sown.  
This child I to myself will take ;  
She shall be mine, and I will make  
A lady of my own.

" Myself will to my darling be  
Both law and impulse, and with me  
The girl, in rock and plain,  
In earth and heaven, in glade and bower,  
Shall feel an overseeing power  
To kindle or restrain.

" She shall be sportive as the fawn  
That, wild with glee, across the lawn  
Or up the mountain springs ;  
And hers shall be the breathing balm,  
And hers the silence and the calm  
Of mute, insensate things.

" The floating clouds their state shall lend  
To her ; for her the willow bend :  
Nor shall she fail to see  
Even in the motions of the storm  
Grace that shall mould the maiden's form  
By silent sympathy.

" The stars of midnight shall be dear  
To her ; and she shall lean her ear  
In many a secret place,  
Where rivulets dance their wayward round,  
And beauty born of murmuring sound  
Shall pass into her face.

" And vital feelings of delight  
Shall rear her form to stately height,  
Her virgin bosom swell ;  
Such thoughts to Lucy I will give  
While she and I together live  
Here in this happy dell."

Thus Nature spake ; the work was done—  
How soon my Lucy's race was run !  
She died, and left to me  
This heath, this calm and quiet scene ;  
The memory of what has been,  
And never more will be.

### THE TIDE RISES, THE TIDE FALLS

Longfellow here gives a fine example of contrast, and the poetic effect obtained by its proper use. Quietly he pictures the ebb and flow of the tide, suggestive of the ceaseless motion of Nature, and suddenly he shows us the frailty of human life in contrast with the mighty force of Nature.

THE tide rises, the tide falls,  
The twilight darkens, the curlew calls ;  
Along the sea-sands damp and brown  
The traveller hastens toward the town,  
And the tide rises, the tide falls.

Darkness settles on roofs and walls,  
But the sea in the darkness calls and calls ;  
The little waves, with their soft white hands,  
Efface the footprints in the sands,  
And the tide rises, the tide falls.

The morning breaks ; the steeds in their stalls  
Stamp and neigh, as their hostler calls ;  
The day returns, but nevermore  
Returns the traveller to the shore,  
And the tide rises, the tide falls.

# A DAISY AT CHRISTMAS

James Montgomery, who wrote these pleasant verses on the daisy, after finding one in bloom on a Christmas Day, was a poet of some note in the first half of last century. He was born in Scotland in 1771, but lived most of his life in England, being the editor of a journal at Sheffield, where he died in 1854.

**T**HERE is a flower, a little flower,  
With silver crest and golden eye,  
That welcomes every changing hour  
And weathers every sky.  
The prouder beauties of the field  
In gay but quick succession shine ;  
Race after race their honours yield,  
They flourish and decline.  
But this small flower, to Nature dear,  
While moon and stars their courses run,  
Enwreathes the circle of the year,  
Companion of the sun.  
It smiles upon the lap of May,  
To sultry August spreads its charm,  
Lights pale October on his way,  
And twines December's arm.  
The purple heath and golden broom,  
On moory mountains catch the gale,  
O'er lawns the lily sheds perfume,  
The violet in the vale.  
But this bold floweret climbs the hill,  
Hides in the forest, haunts the glen,  
Plays on the margin of the rill,  
Peeps round the fox's den.  
Within the garden's cultured round  
It shares the sweet carnation's bed ;  
And blooms on consecrated ground  
In honour of the dead.  
The lambkin crops its crimson gem ;  
The wild bee murmurs on its breast ;  
The blue fly bends its pensile stem  
Light o'er the skylark's nest.  
'Tis Flora's page—in every place,  
In every season, fresh and fair,  
It opens with perennial grace,  
And blossoms everywhere.  
On waste and woodland, rock and plain,  
The humble buds unheeded rise ;  
The rose has but a summer reign ;  
The daisy never dies !

## THE DAY IS DONE

Few of the shorter poems written by Longfellow are more deservedly popular than the following, which has hardly a verse that does not contain some rare beauty of poetic thought and expression. The longing for quiet and peace at the end of a strenuous day has never been better conveyed in poetic form, and the pure pleasures of a good man's domestic life are here celebrated in the worthiest verse. The last stanza of the poem is a favourite quotation.

**T**HE day is done, and the darkness  
Falls from the wings of Night,  
As a feather is wafted downward  
From an eagle in his flight.  
I see the lights of the village  
Gleam through the rain and the mist,  
And a feeling of sadness comes o'er me  
That my soul cannot resist :  
A feeling of sadness and longing,  
That is not akin to pain,  
And resembles sorrow only  
As the mist resembles the rain.  
Come, read to me some poem,  
Some simple and heart-felt lay,  
That shall soothe this restless feeling,  
And banish the thoughts of day.

\*From Poems by Harriet Prescott Spofford, copyright, 1881, by Houghton, Mifflin & Company.

Not from the grand old masters,  
Not from the bards sublime,  
Whose distant footsteps echo  
Through the corridors of Time.  
For, like strains of martial music,  
Their mighty thoughts suggest  
Life's endless toil and endeavour ;  
And to-night I long for rest.  
Read from some humbler poet,  
Whose songs gushed from his heart,  
As showers from the clouds of summer,  
Or tears from the eyelids start ;  
Who, through long days of labour  
And nights devoid of ease,  
Still heard in his soul the music  
Of wonderful melodies.  
Such songs have power to quiet  
The restless pulse of care,  
And come like the benediction  
That follows after prayer.  
Then read from the treasured volume  
The poem of thy choice,  
And lend to the rhyme of the poet  
The beauty of thy voice.  
And the night shall be filled with music,  
And the cares that infest the day  
Shall fold their tents, like the Arabs,  
And as silently steal away.

## ALADDIN

James Russell Lowell, one of our American poets, puts a great deal of thought into these sixteen lines. Quite a long essay, almost a book, might be written to show that the beautiful dreams of youth are worth far more than all the gold one has gathered in old age. But nothing more could be said than is here conveyed, and that is the glory of the poet.

**W**HEN I was a beggarly boy,  
And lived in a cellar damp,  
I had not a friend nor a toy,  
But I had Aladdin's lamp ;  
When I could not sleep for cold,  
I had fire enough in my brain,  
And builded, with roofs of gold,  
My beautiful castles in Spain !

Since then I have toiled day and night,  
I have money and power good store ;  
But I'd give all my lamps of silver bright,  
For the one that is mine no more ;  
Take, Fortune, whatever you choose—  
You gave, and may snatch again ;  
I have nothing 'twould pain me to lose,  
For I own no more castles in Spain !

## A SIGH\*

**I**T was nothing but a rose I gave her,—  
Nothing but a rose  
Any wind might rob of half its savour,  
Any wind that blows.


When she took it from my trembling fingers  
With a hand as chill,—  
Ah, the flying touch upon them lingers,  
Stays, and thrills them still !

Withered, faded, pressed between the pages,  
Crumpled fold on fold,—  
Once it lay upon her breast, and ages  
Cannot make it old !

—HARRIET PRESCOTT SPOFFORD.

# THE ROCK-A-BY LADY

BY EUGENE FIELD




The Rock-a-by Lady from Hush-a-by Street  
Comes stealing, comes creeping;  
The poppies they hang from her head to her  
feet,  
And each hath a dream that is tiny and fleet;  
She bringeth her poppies to you, my sweet,  
When she findeth you sleeping!

There is one little dream of the beautiful  
drum—

“Rub-a-dub!” it goeth;

There is one little dream of a big sugar-plum,  
And lo! thick and fast the other dreams come  
Of popguns that bang, and tin tops that hum,  
And the trumpet that bloweth!




And dollies peep out of those wee little dreams  
With laughter and singing;  
And boats go a-floating on silvery streams,  
And the stars peek-a-boo with their own misty  
gleams,  
And up, up, and up, where the Mother Moon  
beams,  
The fairies go winging!

Would you dream all these dreams that are  
tiny and fleet?

They'll come to you sleeping;

So shut the two eyes that are weary, my sweet,  
For the Rock-a-by Lady from Hush-a-by Street,  
With poppies that hang from her head to her feet,  
Comes stealing, comes creeping.





# LITTLE VERSES FOR VERY LITTLE PEOPLE

**C**HRISTMAS is coming, the geese are getting fat,  
Please to put a penny in an old man's hat ;  
If you haven't got a penny, a ha'penny will do,  
If you haven't got a ha'penny, God bless you.



**A** BUTTERFLY perched on a mossy brown stile,  
And a little maid saw him and cried with a smile :  
" O beautiful butterfly, yellow and blue,  
Stop, stop, let me sit on the stile with you !"  
But the beautiful butterfly, yellow and blue,  
Opened his wings and away he flew ;  
And when he'll return I really can't say,  
But the little maid sits on the stile to this day !

**A** KISS when I wake in the morning,  
A kiss when I go to bed,  
A kiss when I burn my fingers,  
A kiss when I bump my head.

A kiss when my bath is over,  
A kiss when my bath begins ;  
My mamma is as full of kisses  
As nurse is full of pins.

A kiss when I play with my rattle,  
A kiss when I pull her hair ;  
She covered me over with kisses  
The day that I fell downstairs.

A kiss when I give her trouble,  
A kiss when I give her joy ;  
There's nothing like mamma's kisses  
To her own little baby boy.

**H**E was a rat, and she was a rat,  
And down in one hole they did dwell,  
And both were as black as a witch's cat,  
And they loved one another well.

He had a tail, and she had a tail,  
Both long and slender and fine ;  
And each said : " Yours is the finest tail  
In the world, excepting mine."

He smelt the cheese, and she smelt the cheese,  
And they both pronounced it good ;  
And both remarked it would greatly add  
To the charms of their daily food.

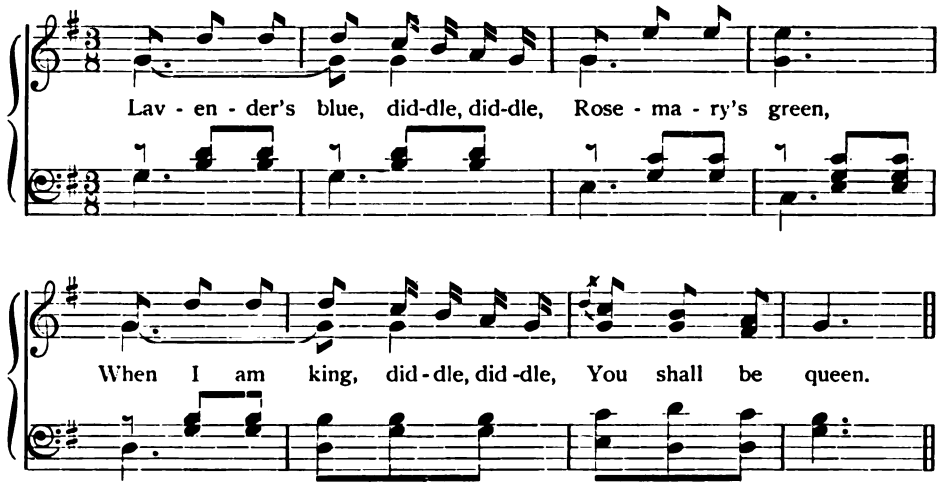
So he ventured out, and she ventured out,  
And I saw them go with pain ;  
And now what befell them I never can tell,  
For they never came back again.

**T**HE grave old clock on the mantelpiece  
Is ticking the hours away ;  
There's never a smile on his solemn face  
Throughout all the merry day.  
Tick-tock, tick-tock,  
Whatever we do or say.



When his hands are showing a quarter to nine,  
We must hurry to school away ;  
The clock never scolds nor gives us a frown,  
If we stop a minute to play.  
Tick-tock, tick-tock,  
Whether we go or stay.

## LAVENDER'S BLUE



## NURSERY RHYMES OF THE CHILDREN OF FRANCE

The French and English versions of these Rhymes are side by side.

**E**N passant dans un petit bois,  
Où le cou-cou chantait,  
Dans son joli chant il disait :  
" Cou-cou ! cou-cou !  
Cou-cou ! cou-cou !"  
Et moi je croyais qu'il disait :  
" Casse-lui le cou !  
Casse-lui le cou !"  
Et moi de m'en cour', cour', cour',  
Et moi de m'en courir.

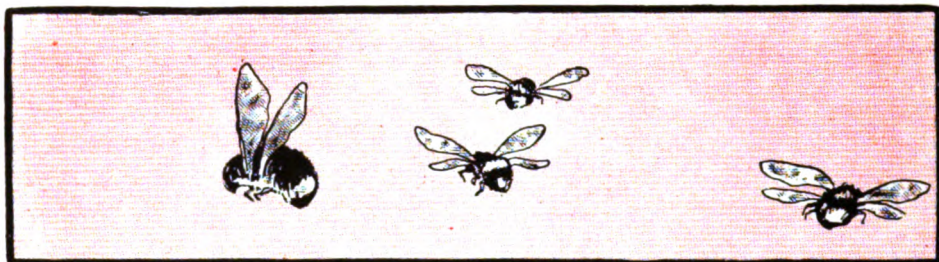
En passant auprès d'un étang,  
Où les canards chantaient,  
Dans leur joli chant ils disaient :  
" Couin ! couin !  
Couin ! couin !"  
Et moi qui croyais qu'ils disaient :  
" Jette-le dedans !  
Jette-le dedans !"  
Et moi de m'en cour', cour', cour',  
Et moi de m'en courir.

En passant devant une maison,  
Où la bonne femme chantait,  
Dans son joli chant elle disait :  
" Dodo ! dodo !  
Dodo ! dodo !"  
Et moi qui croyais qu'elle disait :  
" Casse-lui les os !  
Casse-lui les os !"  
Et moi de m'en cour', cour', cour',  
Et moi de m'en courir.

**P**ASSING through a little wood,  
Where the cuckoo's calling,  
In his pretty song he says :  
" Cuckoo ! cuckoo !  
Cuckoo ! cuckoo !"  
To me it sounds as if he said :  
" Break his neck, do !  
Break his neck, do !"  
And so I run, run, run,  
Faster, ever faster.

Passing near a fishpond,  
Where the ducks are calling,  
In their pretty song they say :  
" Quack, quack ! quack, quack !  
Quack, quack ! quack, quack !"  
To me it sounds as if they said :  
" Throw in Master Jack !  
Throw in Master Jack !"  
And so I run, run, run,  
Faster, ever faster.

Passing by a pretty house,  
Where the good wife's calling,  
In her pretty song she says :  
" Patacake ! patacake !  
Patacake ! patacake !"  
To me it sounds as if she said :  
" His bones I'll break !  
His bones I'll break !"  
And so I run, run, run,  
Faster, ever faster.



Pretty flowers, tell me why  
All your leaves do open  
wide,  
Every morning when on high  
The noble sun begins to  
ride?

SYBIL SCOTT PALEY





## THE FOUR WISE MINISTERS

THERE was a certain King of Benares who had four very wise ministers, and when he wanted to put a heavy tax on his people, they advised him not to do so. This made the king very angry, and he stripped the four ministers of all their wealth and honours, and sent them out of the city.

As the four ministers were walking away from Benares, they came to a track recently made by a camel, and began to talk about the animal. They were still talking about it, when a merchant came up to them, and said that he had lost his camel. One of the ministers asked him if it was not lame in one of its legs; another wished to know if it was not blind in the right eye; the third inquired if it had not a very short tail; and the fourth asked if it was not suffering from some stomach trouble.

"Yes," said the merchant eagerly; "you describe it better than I could myself. Where did you see it?"

"We have never seen it," replied one of the ministers. "But there is its track on the road."

"Why, you know it better than myself!" said the merchant angrily. "You must have found it, and sold it. I shall complain to the king."

This he at once did, and the king recalled his four ministers, and threatened to punish and imprison them if they did not confess the truth.

CONTINUED FROM 4806

"If you never saw the camel," the king said, "how could you tell if it was lame, or blind, or short-tailed, or suffering from some disease?"

"I noticed it left only three foot-prints," said the first minister, "and I concluded it was lame in one leg."

"And I saw," said the second minister, "that the leaves of trees on the left side of the road had been eaten, while those on the right side were untouched. So it seemed to me that the animal was blind in its right eye."

"Now and then," said the third minister, "there were faint specks of blood in the track of the camel. These appeared to have come from mosquito bites, so the camel must have had a very short tail, and was therefore unable to brush the insects away."

"I observed," said the fourth minister, "that the camel's two fore-feet were pressed firmly into the ground, while the sound hind-foot scarcely touched it. I concluded, therefore, that the hind-legs were drawn up by some pain in the animal's inside."

On hearing these explanations, the king was overcome with admiration for the wisdom of his four ministers.

"When four men of your wisdom advised me not to impose a certain tax," he said, "I ought to have followed their advice. The tax shall at once be taken off, and if you will forgive me, and enter my service again, I will always be guided by your counsel."

## THE LITTLE MAN BY THE SECRET SHORE

JOCELINE was very fond of adventures. She was always climbing to the tops of the trees to see what lived there, and when she was three years old she ran away twice, right down the road, to find out where it led to.

Then one day her father and mother took her to stay at the seaside, and after they had been there a little time Joceline noticed that there was one part of the shore they could never reach, because a bit of cliff stuck out such a long way into the sea, and the cliff was so high that one could not possibly get down it.

One morning, when Joceline had awakened very early, she sat up in bed, thinking what a lovely place that secret shore would be for an adventure if only she could find a way through that cliff. After a while she got up and dressed, and then ran out along the road to the shore.

When she had hunted about a good time, she felt so tired that she lay down to rest. And as she lay there, almost asleep, she suddenly saw a tiny black man, dressed like a coal-man, go hurrying through the grass towards a rabbit-hole, into which he disappeared.

Joceline was astonished; she sat up, and was still more excited to notice that the black man had dropped a piece of the biscuit he had been eating. She was so hungry that she picked it up and ate it, and suddenly found herself rapidly growing smaller and smaller, till she was just a little smaller than the black man. She could now enter the rabbit-hole quite easily; so on she ran, for this seemed to her a lovely adventure. The rabbit-hole sloped down to a dark passage, and, as she ran, her heart went bump, bump, bump, for she thought the rabbit-hole must lead to the secret shore.

And so it did. When first Joceline reached the shore, she had to blink her eyes quite hard, for, instead of ordinary stones on the beach, there were diamonds and pearls, and rubies and emeralds, and other sorts of precious stones. How beautiful they were! But the worst of it was, she was so tired and hungry that she couldn't enjoy the sight of the pretty stones at all. She put just a few in her

pockets and determined to go straight home. But when she tried to find the hole she had come out at, she couldn't see it anywhere. So she kept on tumbling over the great stones, and getting more cross, hungry, and tired every minute. At last she saw that she had got quite close to the little black man who was busy filling a sack with precious stones.

Joceline gave a little cough, and then said very politely: "Please, could you tell me the way out?"

The black man gave a regular jump, and turned round in a frightful passion.

"How have you got here?" he shouted. "And after all the trouble I've taken to keep you nasty little fairies out! You bothering, interfering monkey! As if you hadn't got enough pretty things of your own without coming to steal mine!"

"If you please," replied Joceline in a frightened voice, "I don't want your pretty stones. I only want my breakfast. I'm so dreadfully hungry." And she burst out crying.

The black man looked at her for a minute, and then he made a grimace.

"You are not a fairy," he said. "You are only a silly little human girl. But I didn't know they made them that size."

He seemed so pleased to find she was not really a mischievous fairy—for, of course, fairies can't cry—that he got quite good-tempered.

"Want some breakfast, do you?" he asked. "Oh, well, that's easy enough!" And he took a little black stick out of his pocket and waved it a few times in the air, and—what do you think?—all the stones just round Joceline turned into mince pies, jam tarts, sausage rolls, and milk scones!

So Joceline sat down, and began eating away as hard as she could, and the black man turned his back on her and went on stuffing his sack full of stones. When she had eaten as much as she could, she got up and gave another little cough.

"If you please," she said quietly, "I've had enough to eat, and thank you very, very much. And now, please, could you show me the way home?"

The black man turned quickly round. "You're a very nice-spoken little

girl," he said; "and I daresay you think I'm a nasty-tempered man. But it's all those fairies. I have taken no end of trouble to hide the way by which I get here, and yet they go on getting in and stealing my stones. That's why I'm taking all the stones away."

"Where are you taking them to?" asked Joceline.

The black man looked at Joceline.

"Ha!" was all he said.

So then Joceline knew it was a secret. Just at that moment she remembered the stones she had put in her pocket.

"Why," she said, "I'm as bad as the fairies! I've been stealing your

found that she began to feel sleepy—then sleeper and sleeper.

When she woke up, she found herself in her own little bed.

"Why, it must have been a dream!" she said. But to make quite sure she crept out of bed, and felt in the pocket of her dress. Yes, there was something hard inside; and she felt so excited.

She pulled it out—a diamond, such a beauty! She put her hand in again—a pearl, as big as an egg! She put her hand in a third time—a ruby, as big as an apple! She *was* glad.

When she got down to breakfast she showed her mother and father her



AS JOCELINE LAY THERE, SHE SAW A TINY BLACK MAN HURRYING THROUGH THE GRASS

stones, too. I beg your pardon." And she pulled out a diamond, and a pearl, and a ruby that she had picked up.

But the black man told her she might keep them if she promised never to tell where she had found them.

Joceline promised, and then asked him again how she was to get home.

"Come on," he said, and, picking up his sack of stones, he led her along to a hole in the cliff.

"Now lie down and shut your eyes," said the black man, "and before you can say Jack Robinson you will find yourself back in your little bed."

Joceline did as she was told; and immediately she closed her eyes she

wonderful treasures. They couldn't believe their eyes when they saw the gems.

But when they asked her where she had got them, she suddenly remembered her promise, and she said: "I promised faithfully I wouldn't tell."

"Quite right, Joceline," said her mother, for she liked Joceline always to keep her promises, and she could see the stones were fairy stones. And Joceline really never did tell anybody.

Her father sold the shiny stones for her, and got such a lot of money for them that, when she grew up, Joceline bought a lovely house and garden, and got all the poor, ragged, hungry little children she could find in the streets, and made them come and live with her.



## A CLEVER BAD MAN

THE STRANGE TALE OF VIDOCQ, THE BAKER'S SON WHO ASTONISHED THE WORLD AND LEFT A NAME THAT WILL NEVER BE FORGOTTEN

TOWARDS the end of the eighteenth century, a baker, living in the French town of Arras, had a son born to him who was destined to astonish the world, and leave behind him, in the annals of crime, an almost imperishable name.

The baker's name was Vidocq, and he appears to have been a hard father, but very industrious and honest. By the time that little Vidocq was eight years of age, the father's strap was in daily use. Whether he might have made something good out of his son

he was sent to prison. This experience did not cure him, however, and directly he was set free he stole the money-box of his own father and ran away.

After terrible sufferings with showmen, menageries, Punch-and-Judy exhibitions, and the like, Vidocq returned home, famished and miserable, to be welcomed with tears by the poor mother who loved and adored him.

We have not room to tell the full story of this extraordinary person, and so we must hurry over many of his adventures and come to the time when



YOUNG VIDOCQ WAS WELCOMED WITH TEARS BY HIS POOR MOTHER, WHO ADORED HIM

by kindness and wise advice we cannot tell; all we know is that the little Vidocq was a bad boy, that his father constantly beat him, and that he grew steadily worse.

When he was sent out with a basket of loaves, he often stopped to talk to the thieves and low characters in the town, and was proud to be their friend.

He learned from these scoundrels how to steal money out of shop tills with a feather which had glue at the end. He robbed fowl-houses. He stole everything he could lay hands upon, and sold the articles in pawnshops. In vain his father flogged him.

The boy appeared incurably bad, and

he made his first escape from prison. Locked up on a false charge, Vidocq escaped by means of a woman's disguise, brought into the cell by his sweetheart. Instead of concealing himself or flying from the town, he walked about in broad daylight, and at last went into a tavern. As he sat there a sergeant and four men approached.

"If you are looking for that rascal Vidocq," said the escaped prisoner, "hide in this pantry, and you will see him come in. When he enters the room, I will make a sign to you."

No sooner were the five men safely in the pantry than Vidocq quickly turned the key upon them, and said :



## VIDOCQ ESCAPES IN SIGHT OF THE POLICE



On the day of his trial, Vidocq, while waiting in a small room, put on the hat and cloak of a gendarme, or policeman, who had left them there while he entered the court. Then, taking a prisoner by the arm, Vidocq passed out.

"It is Vidocq who has locked you in. Farewell, my kind friends, farewell."

A few days after, he was caught and placed in a cell with another prisoner. This prisoner had begun to make a hole in the stone wall, and Vidocq assisted. Just before the day of his trial they thought the hole was big enough for them to escape through. Vidocq crept in, but the hole was too narrow; he could neither advance nor draw back. His agony was so great that his cries brought the sentry, and he was dragged out of the hole, bleeding and nearer death than life.

On the day of his trial he was taken with eighteen other prisoners to the court. They passed a corporal and a troop of soldiers, and entered an ante-room. There were two gendarmes in charge of them. One of these gendarmes put down his hat and cloak and entered the court. Hardly had the door closed than Vidocq slipped on hat and cloak, and, taking a prisoner by the arm, led him quietly to the other door, and passed out before the corporal and his troop.

He was taken again after a few months of freedom, but escaped very simply, because the gaoler one night failed to fasten him in properly. The next time he was caught he found himself thrown into a cell occupied by two desperate prisoners. They told him that they were working their way through the stone floor, and that very soon they would be near enough to the river surrounding the prison to permit of their dropping quietly into the water and swimming away.

At last the burrow was complete, and all they had to do was to drop quietly into the river and swim to shore.

But they had miscalculated. Instead of having to drop into the water, as the last stone bulged out from its place the river came rushing in upon them, and poured, with a roar, up their tunnel. They had dug too deeply. When the gaolers arrived they found the three prisoners splashing about in a flood, drenched to the skin.

After more adventures Vidocq was brought to trial on a charge of forgery. He was perfectly innocent, but his record was so bad, and the evidence against him seemed so clear, that he

was pronounced guilty. And then was passed upon him by the judge the terrible sentence of eight years at the galleys.

"The chain of galley-slaves," says a writer of Vidocq's life, "linked two by two, set out upon the march for Brest. By day they toiled on foot, dragging a weight of fifteen pounds at either ankle, or rode upon long waggons, while their irons, white with hoar-frost, struck cold into their bones.

The galleys filled Vidocq with horror. To live there would have driven him mad. He soon made plans for escape. From one of the convicts Vidocq obtained a file, a wig, and a sailor's shirt and trousers. He filed at his chains till they were almost separated, put on his sailor's dress under the convict's garb, and, while he was at work at the pumps, slipped behind some timber, snapped his chains, threw off his prison dress and, putting on his wig, escaped into the town.

But the greatest danger lay ahead. To get out of the town he had to pass the city gate, which was watched by an ex-galley-slave, a man who could detect a prisoner even by his walk. Vidocq, however, marched straight up to him, asked him for a light, and then passed calmly out into freedom.

Soon after he was in prison again, for in France every tramp must show his passport to the police, and so it is very difficult for a man who is once down in the world ever to rise again.

This time he got himself into the infirmary by chewing tobacco which made him ill, and there, by wheedling one of the attendants, he procured a nun's dress, and so escaped.

He made his way in safety to a town where there was a tavern recommended to him by a convict. He found this house, gave the password, and was shown by the landlady into a room filled with desperate robbers, who started at sight of a nun. He was given clothes on condition that he would help in robbing a house. But Vidocq wanted to live an honest life. He escaped from these villains, and made his way home. Always, it seems, this desperate man had a tender regard for his mother.

It was unsafe for him to remain in his native town, and he set off for Holland. Many adventures befell him, on sea as well as on land, and at last



he was captured again and once more sent to be a galley-slave, this time at Toulon. He was far worse off now than he had been at Brest, for he was chained day and night to a bench with the foulest wretches in the prison.

Later on, Vidocq was placed with the working gang, and, soon after, with a file and a disguise, he escaped. But this time he found, to his horror, that no one could pass the city gate without a green card signed by the Governor. As he stood wondering what he should do, the gun sounded from the fortress, telling everyone of a prisoner's escape. At that very moment a funeral drew near, so Vidocq mingled with the mourners, and, in a flood of tears, safely passed through the gate.

He had not walked far when he fell in with a sportsman who asked him if he would join a band of sixty honest citizens who had taken to the woods rather than serve the press-gangs. Vidocq gladly accepted the offer, but soon found that the "honest citizens" were a gang of highwaymen.

One night a bandit declared that he had been robbed of his purse. Vidocq, as the newest recruit, was at once suspected. He was seized and stripped. No purse was discovered, but on his shoulder was the brand of a galley-slave.

It was instantly settled that he should be shot. Vidocq heard the

muskets click, but at that moment an idea occurred to him. He whispered something to the captain. The captain agreed to his proposal. He prepared a bundle of straws, and said: "You will each draw one of these straws from the bundle, and the man who has stolen the purse will draw the longest."

When they had drawn, it was found that one of the bandits had a straw shorter than the rest.

"You are the thief," cried the captain; "for the straws were all of equal length, and guilty terror made you shorten yours." In this way Vidocq was saved; but he was sent off.

He disguised himself as a peasant, drove cattle, and made his way home; but, later on, he was recognised and arrested. Once more he escaped, and finally came to be a soldier. He distinguished himself, and might have risen in the army had he not been recognised as a galley-slave.

He escaped by jumping a dizzy height from his cell window into the river. He became a tailor in Paris, and there his poor mother joined him. But all attempts to lead an honest life were in vain. He was arrested again, and was once more thrown into prison.

Weary of his life, Vidocq considered how he might deliver himself from the burden of his past, and on page 5073 of this book we read how he fared.

## HOW THE THIEF WAS FOUND OUT

**M**OSTAFA, a wise and rich merchant of Damascus, had an only son, Said, whom he wished to train up in prudence; but Said trusted too much in a young Armenian, who managed to cheat him several times without raising his suspicions.

One day Mostafa and Said were compelled to go on business to Baghdad.

"Now, who can I trust all my money with during our absence?" said the merchant.

"With my friend the Armenian, of course," said his son. "He is the most honest man in Damascus."

"Very well, Said," exclaimed the merchant. "For once I will rely upon your judgment."

He gave his son a large, heavy strong-box to entrust to the keeping of the Armenian, and when Said returned he took him to Baghdad. Two months

afterwards they returned to Damascus, having made a considerable amount of money out of the business they had done.

"Now, my son," said Mostafa, "go to your friend and get my strong-box."

Said went to the Armenian, and quickly returned in great anger.

"You have insulted my friend," he exclaimed. "It was not money you entrusted to his safe keeping, he says, but a mass of broken stones!"

"Pray, how did your very honourable friend find that there were only stones in my strong-box?" said Mostafa. "He must have broken the three locks, and this, I think, will now prove to you that it was well I entrusted him with nothing of any value."

Said hung his head, and thenceforward he allowed himself to be guided in his judgment of mankind by his father's wisdom and experience.

## STORIES FROM THE TALMUD

AMONG the volumes held sacred in the world to-day and for centuries past, the Jewish Talmud will always take a prominent place. It is regarded by the Jews almost as a second Bible, and a great part of it consists of traditions and laws that are said to have been handed down from the time of Moses by word of mouth. It contains the writings of all the greatest Jewish rabbis, or teachers, and consists of history, geography, poetry, law, and theology, unlike anything else in all literature. There is much that is dull and trivial ; but there is also much that is wise and true, and many good stories, some of which are given below.

### THE RICH MAN'S DIAMOND

A RICH Jew, who had a very poor neighbour, was told by a fortune-teller that some day all his wealth would



THE WIND CARRIED HIS TURBAN AWAY

belong to the poor man. This preyed upon his mind, so he sold everything, and with the money purchased a large diamond, which he sewed in his turban.

"Now," said he, "my poor neighbour can never obtain my diamond."

Some time afterwards, when he was at sea, the wind carried his turban from his head, and it fell into the water and sank.

"At any rate," thought the Jew, "if I have lost the diamond, my poor neighbour can never get it."

But a few days later the poor man bought a fish in the market-place, and upon cutting it open found the diamond, which had been swallowed by the fish.

### THE BEAR IN THE WELL

A FOX and a bear were out walking together one day, when, as they passed a house, they smelt the dinner

cooking. The fox suggested to his companion that they should creep into the kitchen when no one was there and steal some of the food. The bear agreed ; but while they were in the kitchen the cook came in, and the bear was caught and punished. For this he threatened to kill the fox ; but the cunning fox said : "Pray do not let us quarrel. I will take you to another place where we shall certainly obtain plenty of food."

At night the fox led the bear to a deep well, and, pointing to the reflection of the moon in the water below, said :

"There is a fine cheese. We will go down and secure it."

He then got into one of the buckets at the end of the rope, and told the bear



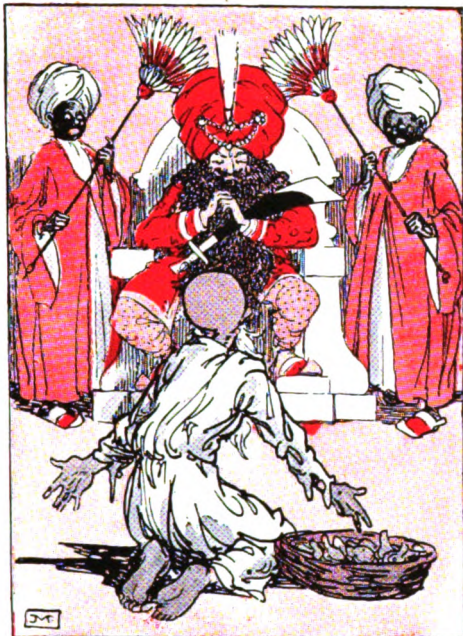
"DO NOT LET US QUARREL," SAID THE FOX to get into the other. But as he was too light to balance the bear's weight, a large stone was placed with him in the pail.

As soon as the bear had entered the other bucket, the fox threw out the stone, and the bucket with the bear inside descended, and was left in the well.



## THE EMPEROR AND THE FIGS

**A**n emperor, seeing an old man planting a fig-tree, asked why he was doing this. The man replied that he



THE EMPEROR ACCEPTED THE PRESENT

might live to eat of the fruit ; but even if he did not, his son would enjoy the figs.

"Well," said the emperor, "if you do live to eat of the fruit of this tree, I pray you let me know of it."

The man promised to do so, and, sure enough, his life was prolonged until the tree grew and bore fruit, which the old man ate.

Packing some of the finest of the figs in a basket, he set out for the palace, and, when he explained his errand, was shown by the guards into the emperor's presence.

The emperor was so pleased that he accepted the present of figs, and ordered the old man's basket to be filled with gold.

Now, next door to this old man there lived a woman who was very covetous, and, seeing his good fortune, she packed some figs into a basket and persuaded her husband to take them to the emperor in the hope of receiving, in return, a basket full of gold.

But the emperor, on learning the man's errand, ordered him to stand in the courtyard, and had him pelted with the figs. When the man arrived

home and told his wife all that had taken place, she consoled him by saying :

"Ah, well! you may be thankful they were figs, and not hard cocoanuts."

## THE KING'S WATCHERS

**A**CERTAIN king, who had an orchard of fig-trees, prized the fruit so highly that he determined to have the trees guarded in order that the fruit might not be stolen. For this purpose he placed in the orchard a blind man and a lame man.

The next day, when the king visited the orchard, he found that much of the fine fruit had gone, and he asked the watchers what had become of it.

"I do not know," replied one man.

"Nor I," said his companion.

The king then asked if they had eaten the fruit themselves.

"I could not steal the figs," said the lame man, "for I could not walk up to the trees."

"And I could not take them," said the blind man, "for I cannot see."

But the king was very wise, and he soon discovered that the blind man had carried the lame man, and that while the blind man had used his legs, the



THE KING ASKED IF THEY TOOK THE FRUIT  
lame man had used his eyes and hands, and in this way the figs had been stolen. Both the men were severely punished.

## THE LITTLE LOMBARD SENTINEL

A VERY popular work with the children of Italy is "Cuore," which means Heart. It is written by E. de Amicis, in the form of a schoolboy's diary. Every month it contains a true story of a boy hero, and this story from "Cuore" has been translated by a clever little subscriber to the BOOK OF KNOWLEDGE, Cesarina Cagnetta, who is only ten years old.

THE event written down in this little story happened in the year 1859, a few days after the battle of Solferino and San Martino, won by the Italians and French over the Austrians, during the war for the liberation of Lombardy from the oppressive yoke of the latter.

One early June morning a little company of the Saluzzo cavalry wound its way slowly by a lonely pathway in the direction of the enemy. It was inspecting the country on all sides. The company was led by an officer and a sergeant; and all gazed silently into the distance, their eyes fixed, ready to see at any moment the white uniforms of the outposts of the enemy between the trees.

In this way they came up to a small cottage surrounded by trees. In front of the door a boy was standing; he might have been twelve years old. He was peeling a thin branch with his pen-knife to make himself a stick. From a window of the cottage a large Italian flag was flying. The cottage itself was deserted. The peasants, having hung out the flag, had run



"WHAT ARE YOU UP TO HERE?" ASKED THE OFFICER

away for fear of the Austrians. The moment he saw the horsemen the boy threw away his stick and lifted his cap. He was a handsome lad, possessing an open face, with big blue eyes and fair hair. He was in his shirt-sleeves; and the unbuttoned collar showed his bare neck.

"What are you up to here?" asked the officer, stopping his horse. "Why didn't you leave with your family?"

"I have no family," answered the boy. "I am a foundling. I work a little for everybody. I am waiting here just to see the war, and watch the Italians defeat their foes."

"Have you seen any Austrians pass?"

"No, not for three days."

The officer sat still, thinking a moment; then he dismounted, and, leaving the soldiers, he went into the house and up on to the roof. The cottage was low, and from the roof he could see only a small stretch of country.

"One would have to climb a tree," thought the officer, and came down.

Just in front of the court a tall tree shot its leafy top into the blue sky. The officer was still lost in thought, looking first at the tree and then at the soldiers. All of a sudden he turned to the boy and said:

"Can you see well, young one?"

"Me? Oh, I could see a sparrow flying a mile away!" answered the boy.

"Could you climb to the top of that tree?"

"To the top of that tree? In half a minute!"

"And could you tell me what

you see from there—if there are any Austrian soldiers in that direction, or clouds of dust, or guns that shine, or horses?"

"Of course I could."

"And what shall I give you for being such a help to us?"

"What shall you give me?" repeated the boy. "That's good! Nothing! If it were for the Austrians—never! But for ours! I am Lombardo!"

"Very well, then, climb up the tree."  
 "A second, while I take off my boots," said the lad.

He pulled off his boots, tightened the strap round his waist, threw his cap on the grass, and flung his arms round the trunk of the tree.

"But look out," exclaimed the officer, putting out his hand to stop the boy, as though a sudden fear flashed through his mind.

The boy turned round to look at him, a question in his frank blue eyes.

"It is all right," said the officer. "Go on, climb up the tree!"

The brave boy climbed like a cat.

"Look in front of you!" shouted the officer to the boy.

In a few seconds the boy was at the top of the tree, his body clinging to the slender trunk, his legs hidden by the branches; but from his waist upward there was nothing to shield him. The sun beat on his fair head, making it almost golden. The officer could hardly see him, he looked so small up there.

"Look right in front of you!" shouted the officer anxiously, as he gazed up.

The boy, to see better, loosed his right hand from the tree, and shaded his eyes with it.

"What do you see?" asked the officer.

The boy leaned towards him, and putting his hand to his mouth, shouted: "Two men on horseback on the white road."

"How far from here?"

"Half a mile!"

"Are they moving?"

"No, they're not."

"What do you see?" asked the officer, after a moment's silence. "Look to the right." The boy looked to the right.

Then he said:

"By the cemetery, through the trees, there is something that glitters. I don't quite know, but I think it's bayonets."

"Do you see people?"

"No; I expect they're hidden by the cornfields that lie beyond the trees."

At that moment a bullet whistled high through the air and buried itself in the ground behind the cottage.

"Come down at once, boy!" shouted the officer. "They've seen you. I don't want anything else. Come down!"

"I am not afraid," answered the boy.

"Come down!" repeated the officer.

"What is there to the left?"

"To the left?"

"Yes, to the left of you."

The boy leaned to the left. At that instant another bullet whistled through the air.

The ball had passed very near him.

"Come down!" shouted the officer in a sort of frantic, fierce command.

"I'll come down at once," answered the boy; "but the tree shields me. Do you want to know what is to the left?"

"Yes," answered the officer. "But come down!"

"To the left," shouted the boy, stretching his body to that side, "where there's a little chapel, I think I see——"

A third ball cut through the air, and the boy turned. For a moment he seemed to cling to the trunk and branches, and then he fell head foremost, with open arms.

"Malediction!" cried the officer, rushing up.

The boy fell on his back, his arms outstretched; a little stream of blood flowed from his left side. The sergeant and two soldiers leapt from their horses. The officer bent down and unbuttoned the boy's shirt. The ball had entered the left lung.

"He's dead!" exclaimed the officer.

"No, he's alive!" answered the sergeant, holding his hand.

"Poor boy—brave little fellow!" cried the officer. "Courage, courage!"

But while he was saying "Courage" and pressing his handkerchief to the wound, the boy opened his eyes wide and seemed to look at him, his head fell back, and he died.

The officer turned pale. He held him for a moment longer, gazing at him, then he laid him on the grass.



THE BOY WAS AT THE TOP OF THE TREE



He got up and stood looking down at him; and the sergeant and the two soldiers stood motionless over him.

"Poor boy! Poor boy!" the officer repeated sadly.

Then he went into the house, took away the Italian flag, and spread it over the little dead body, leaving only the face uncovered. The sergeant picked up the boots, the cap, the half-peeled stick, the knife, and put them all together at the boy's side.

They stood silent for a moment, then the officer turned to the sergeant.

"We will send the ambulance for him," he said. "He has died as a soldier; the soldiers shall bury him!"

When he had said this, he kissed his hand to the boy and shouted, "To

horse!" The soldiers jumped on to their saddles, the company formed again, and they resumed their march. By the same road that the cavalry had trod that morning, passed in the evening a large battalion of soldiers who had

fought valiantly a few days before at the great battle of San Martino.

The story of the boy's death had already spread itself among the soldiers before they left the camp.

The path, which was on the bank of a little stream, ran within a few steps of the cottage. When the first officers of

the battalion saw the little body stretched at the foot of the tree and covered by the flag, they saluted with their swords; and one of them, as he passed, snatched a few blossoms and threw them on the little form.

Then all the men, as they marched, plucked flowers too, and scattered them over that silent form. And officers and soldiers alike saluted him as they passed.

"Bravo, bravo, little patriot!"

One officer

threw him his medal for valour; another stooped to touch the boy's forehead.

And the flowers still rained on his fair head. And he slept on in the grass, as though he was glad to have given his life for his dear country, Lombardia.



"BRAVE LITTLE FELLOW!" CRIED THE OFFICER

## THE LAWYER AND THE OYSTER

As two men were walking by the seashore, they found an oyster, and began to quarrel about it.

"I saw it first," said one man, "so it belongs to me."

"I picked it up," said the other, "and I have a right to keep it."

As they were quarrelling a lawyer came by, and they asked him to decide in the matter.

The lawyer agreed to do so, but, before he would give his opinion, he required that the two men should give him their assurance that, whatever he might say, they would be quite satisfied with his decision. Then the lawyer said:

"It seems to me that you both have a claim to the oyster; so I will divide it between you, and you will then be perfectly satisfied."

Opening the oyster, he quickly ate it, and very gravely handed to each of the men one of the empty shells.

"But you have eaten the oyster!" cried the men.

"Ah, that was my fee for deciding the case!" said the lawyer. "But I have divided all that remains in a fair and just manner."

That is what generally happens when two quarrelsome persons go to law about anything they cannot agree upon.

# The Child's Book of Its Own Life

## WHAT THIS STORY TELLS US

THE whole of our perceptions and ideas and beliefs and all our reasoning are built up on the basis of sensation and memory. When we see a chair, and know that it is a chair, that knowledge is called a percept, which simply means a thing perceived. The natural tendency of the mind, at all times, is to make percepts; to put things together and see what they come to, so to speak; and so when we see a chair, or anything at all like a chair, the new sensations coming into the mind are not merely received, but are dealt with. The mind has already in it the memory of many percepts which it called chairs, and the memory of these goes to form part of the total impressions that our minds get. In other words, memory of past sensations, and especially of past sensations that have been built up into percepts, enters into all our new sensations.

## WHAT HAPPENS WHEN WE THINK

WHEN we come to study sensation, we must remember that it is impossible for us to tell what a pure sensation is like, because we never feel a pure sensation. Every sensation we get after early babyhood is mixed up with the memories it revives. We must also remember another very important thing. One old wrong view of the mind—wrong even though it was held by so great a man as John Locke—was that it is like a smooth white sheet of paper on which the outside world comes and prints its marks. According to this view, the mind, like a sheet of paper, is quite passive; it does nothing when we receive sensations, save only to accept them. It contributes nothing at all of its own, and all that can be said of it is that it is there, and receives.

We now know that this is very far from being the truth: One of the great facts recognised now by all the students of the mind, and seen to be vastly important, is that when things are coming into the mind, the mind is not passive, but active. When we hear a piece of music, our minds are doing just as much in their way as the mind and fingers of the player are doing in their way.

For one thing, if we are paying attention, that in itself is an act, and, as we all know, sometimes a very difficult one, and just as tiring as hard running or swimming. More than that, many parts of the brain, specially concerned

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with the subject in hand, are roused to activity when new sensations come in. The brain is always trying to make sense of them, as we say, though the phrase is rather misleading. All the time, though we are often

quite unconscious of it, the brain is comparing what has just come in with what has come in on previous occasions—putting two and two together, saying this must be a chair, and that is my brother; or, on a higher plane, declaring that this thing is true because something else that we know proves it. The higher and better the brain, the more certainly it is doing these things, whenever we read or look or listen, and therefore nothing can be a greater mistake than to suppose that sensation is a passive process, as when a sheet of paper is written upon.

If we have attended carefully to what has just been said, we must have noticed in it hints of another process which follows upon sensation and perception and real attention. That process is what happens when one thing, entering the mind, calls up the memory of another.

The name of this process is *association*. It is usually called the *association of ideas*; but that is not a very good name, because we associate, more or less, anything and everything that enters or can exist in the mind. Sights, sounds, tastes, feelings, and everything else, as well as ideas, are nearly always associated in the mind.



We say that one thing reminds us of another. This is to say that, acting through memory, one thing is associated with another; but association is not limited just to the times when we notice and remark how one thing suggests another to our minds. It is really going on all the time, in small things as well as in great; faintly, as when we are just noticing things in a general way, or vividly, as when we are thinking with all our might.

#### THE WONDERFUL WAY IN WHICH OUR THOUGHTS ARE LINKED TOGETHER

The first man to write down anything like a clear account of this great law of association was the Englishman, Thomas Hobbes—of whom we read on page 4620—and this subject has always been studied more especially in England than anywhere else since his time. It is very interesting that, in later years, we have been able, by studying the course of the fibres in the brain from one part to another, to get some key to the way in which association works. Certainly these discoveries would have deeply interested Thomas Hobbes.

We realise now that all thinking is *relating*, as it is called—that is to say, associating. We can understand how it is that the greater part of the human brain consists of association cells and association fibres. They are not directly concerned with any kind of sensation, but are concerned with linking up our sensations, so that, by a gradual and orderly process, it is possible for our minds to pass from an infant's first dim appreciation of the difference between light and darkness to the highest ideas which we can have, such as the conception of the nature of light, and the Power whence it springs.

#### HOW ALL OUR THINKING DEPENDS UPON OUR MEMORY

Though association is so wonderful, and lies at the bottom of all thinking, yet the laws of its working are really not very difficult to understand. It depends, of course, upon memory. Let us ask ourselves why it is that one thing calls up another and not something else, and why it calls up one thing to one person and another thing to another person. Why does a cat suggest a mouse to our minds, or why, to a particular person, should a chair suggest the name of some old friend,

perhaps, who has been dead for many years? It is possible to answer these questions fairly well. We associate things when we have seen them at the same time, which would mean an association of place as well as of time; we also associate things because they are like one another, and sometimes, though it sounds curious to say so, one thing suggests another just because that other thing is very different. The last two cases we may call association by likeness and by contrast.

These are all the kinds of association that are usually described; but perhaps there is also a kind of association of cause and effect in the minds of people who are apt to think of causes and effects. Probably this is so, because we are sure now that there is a kind of memory which goes by causes, as when we remember a thing because we know the reason for it. This is much the highest type of memory.

#### CLEVER ANIMALS THAT ARE ABLE TO THINK LIKE MEN

Learning of every kind depends upon memory. It is certainly true that all except the very simplest kinds of learning, and perhaps those also, depend upon association. We must not, however, suppose that human beings are the only creatures that have this power. Animals have it in some degree, and the more intelligent the animal is, the clearer is the evidence we get of the association of ideas.

A striking case is that of the old war horse which, when it was young, plunged into battle at the bugle's call. Years afterwards the sound of a bugle may rouse it to the most tremendous excitement and expectation, because there has been established in its mind an association of ideas between a bugle and a battle. This association of ideas may, of course, be noticed in dogs; indeed, there is no doubt that dogs have a certain amount of power of reasoning, and there can be no reasoning without association of ideas.

In human beings the power of association varies enormously, and, on the whole, we may say that, beyond a doubt, the greater, the deeper, the wider, the richer, the more varied the power of association in a person, the higher and finer is the mind of that person; but we must particularly add

that the quality of the associations made counts for everything. To one man it may be the mere surface which suggests something else; but to another man it is the truth underneath.

**THE DIFFERENT THINGS A NAME MAY BRING INTO TWO MEN'S MINDS**

The lowest kind of association worth mentioning at all is the case of punning, though, of course, punning may be amusing and delightful in its way. But there is all the difference in the world between the man to whom the word Socrates suggests some joke about a sock or a rat, and the man whom it reminds of the death of Socrates and of his words, "Fear not for me; to the good man no evil thing can happen." Each of these is a case of the association of ideas; but the one man is only a punster and the other is a thinker.

As association is so all-important, how far may we hope to improve it in ourselves and others; can we do so, or can we not?

Association depends upon what there is to associate, and that depends on past sensation and perception. To go back to our previous instance: if all that one man knows of Socrates is that he once read a book in which that was the pet name given to a cockatoo, the name of Socrates cannot suggest to him any more than what the book makes possible. But if the same man, instead of reading that book, had read Plato's account of the death of Socrates, then the name would suggest to him something with a deeper meaning.

**WHY WE SHOULD THINK ONLY OF THINGS WORTH REMEMBERING**

One of our great duties towards ourselves, therefore, which we cannot begin to understand or to practise too soon, is, first, to fill our mind with things worth having, and worth being reminded of by association in after years; secondly, to avoid, as far as possible, foolish books, the talk of foolish people, and things of that kind which it is not worth while to have in our minds at all; and, thirdly, to avoid things which are actually wicked or disgusting or destructive. These may get into the mind by accident before we know what is happening, and at any moment we are liable to be reminded of them.

Even though the purse be rather lean,

let us remember that there is no better treasure than a mind well filled with beautiful, true, and valuable memories of noble things seen, noble sounds heard, noble ideas, great poetry, recollections of friends, and so forth. A man with such a mind may say to himself, "My mind to me a kingdom is," or may talk with Wordsworth of "that inward eye which is the bliss of solitude."

We cannot express too strongly the importance of what has been said about filling the mind with good materials for association. It applies to everybody, whatever his business in life. The artist cannot see too many beautiful sights, the man of science cannot store away in his mind too many truths, and the greatest man of science is the one who has in his mind many truths of different kinds, and who can associate them together.

**THE DIFFERENCES BETWEEN BRAINS THAT CAN NEVER BE ALTERED**

But when all is said and done, the fact remains that there are natural differences between various people, which there is no doing away with or getting over. These differences depend upon something in the making of the brains of the persons in question, and they simply have to be accepted.

Different brains vary very much in the number of their association cells and association fibres, and also in the course which the fibres take. We do not know very much yet about the subject from this point of view, for the comparison of brains has really only just begun; but we know a good deal more about it from the study of actual people and the way in which their minds work.

Of course, we shall only be confused and come to wrong conclusions if we do not allow properly for the effects of education, and the differences between the contents of different people's minds. Often, of course, it will be difficult to say to what extent the differences between people are due to differences in what has been put into their minds, and to what extent they are due to the very nature of their minds. But though we shall often be uncertain, yet still there is clear evidence that people differ naturally in these respects, and also that these differences are the real

basis of the differences existing between one man's mind and another—the stupid and the clever man, the poet and the man of science, and so on.

**SOMETHING THAT BOYS AND GIRLS CAN DO QUICKER THAN OLDER PEOPLE**

In the first place, there are differences in mere quickness of association, as we all notice in the talk of different people. The process is often extraordinarily quick in children, as their sharp replies testify. In old age it becomes very much slower. There are also differences in the variety of association, some people's minds always running more or less in one direction, while the mind of a great poet, like Shakespeare, makes associations of every conceivable kind.

Some of the special kinds of association are worth noticing, especially as we cannot too soon realise that these differences are natural. If the world were wise, one of the greatest tasks it would set itself would be, in the interests of everybody, to find out quite early the special natural tendencies of different children, and then to try to make the most of them on the lines which Nature has dictated. So many lives are spoilt, so much time is wasted, so much misery caused by our trying to make a child into this, or that, or the other, when the whole structure of his mind, if we could only see it, declares that he will never do that thing well, but might do something else very well indeed.

It is true that there are a great many people in whom there is no very marked tendency in any one particular direction. But very often we think that such is the case when really we have just failed to keep our eyes open.

**WHY SOME PEOPLE ARE QUICK AND CLEVER AT ARITHMETIC**

In some minds associations are keen and strong in the direction of numbers. No one can say what it is in the brain that decides this, but for practical purposes it really does not matter—the fact remains. Counting, calculating, measuring, reckoning, comparing in terms of length and number and quantity—all these are things which come naturally to a person, and, like other things which come naturally, are done with pleasure. Apart from lessons or work, his interests and pleasures and games, the things he wants to know and

find out will largely take the direction of numbering and measuring and calculating.

Now, there are many good and useful careers for such a person; but, on the other hand, there are people in whom associations of number are few, slow, difficult, and, indeed, positively unnatural, though they may take a deep interest in flowers and plants, the face of the sky, the weather, the wind, and so on.

Are we right in trying to make bank clerks, shall we say, of these people, or ought they to go to a farm to help in the great work of providing food for mankind?

While some people think in numbers, others, rather of the same type, think easily and quickly in terms of space. Some like putting things together and taking them to pieces; they like making little toy machines; they want to know the method by which everything works, and are naturally clever in knowing what will fit into a certain space, and how to make a toy work in one way if it will not work in another.

**THE KIND OF PEOPLE WHO ARE CLEVER AT UNDERSTANDING MACHINES**

These are the practical people to whom engineering probably offers the best careers, though we must not judge by the tastes which children of five or six or seven years old have, as these tastes often come and go. If associations of number are strong in these people, so much the better for them, for mathematics and geometry go well with the engineering faculty, and help to make the best engineers.

In the highest types of this kind of mind it is possible not merely to understand associations which earlier minds have formed, but to form new ones which no one has ever formed before. So that a person of this type does not merely understand the old machines, but he can invent new ones.

If he be working more at theory than at practice, his powers will show themselves in devising new experiments and new kinds of apparatus for making experiments with, and the practical difficulties, which would utterly dishearten people of another type, give him pleasure to conquer. Other people's minds would simply stop working, but his seems to think more clearly.

These are the people who make either great inventors or great experimenters, adding to our knowledge of heat and

electricity and light, and so on. Mr. Edison is the finest example alive of this type of mind working at practical invention; and it is certain that if he had chosen to invent machines for experimenting with, instead of inventing things for practical purposes, he would have been no less successful.

Such a great worker as Sir Joseph Thomson, President of the British Association, offers an instance of this type of mind devoted to scientific experiment. Lord Kelvin was the greatest example of the same type of mind in the nineteenth century, and he divided his time between practical invention and scientific experiment. In each he was as successful as any man ever was, and he very clearly showed that it is the same type of association which makes the inventor and the man who experiments.

#### PEOPLE WHO CAN MAKE PICTURES IN THEIR MINDS

In inventing and experimenting, in engineering, and in geometry, too, there is a good deal of seeing with the mind's eye—making visions in the mind of how things will work—how they will go together, how they will fit, how they may be arranged, and so on.

This power of making pictures in the mind is called *visualising*, and in all people with this kind of mind visualising is very powerful, and it forms their most natural way of thinking. Not only can they call up in their mind very clearly the memory of past *percepts*, so that if they have once seen a machine work they can always recall to mind how it worked, but also, as we have seen, they can make new percepts in their minds, and then make them real—and then we get a new invention, like the steam-engine or the phonograph.

There is another type of visualising mind which, though it is the same in a way, is very different. In the type of mind we have been discussing, associations of cause and effect, and also a good deal of calculating, commonly come in. These people are not much concerned with the outside appearances of things; they perhaps take no particular pleasure in beautiful colour or form. But there is yet another kind of visualising, not at all scientific or inventive, and yet invaluable in its own way, where the associations in the person's

mind go more by the appearances of things, and especially by comparisons and recollections of their form and colour, their light and shade, their appearances at different times of the day, at different times of the year, and so forth.

#### THE THINGS THAT HELP TO MAKE ARTISTS OR SCULPTORS

In the autumn some people can call up clearly in their mind's eye the vision of what a certain landscape looked like in the spring. It is natural for them to notice these things, and to make these comparisons or associations. When they are talking to people, they do not attend very particularly to the tones of the voice, and they are perhaps not particularly interested in what is being said, but they are watching and remembering and comparing what other people never notice at all, even in the faces of people that they love—the movement of the eyelids, the little tricks of the lips, the poise and movement of the head, and so on.

These people are the artists, drawers, painters, sculptors, architects, and decorators. It is unfortunately true that the artistic people usually despise the scientific people because they care so little for beauty, and often make such ugly things; and the scientific people, in their turn, despise the artistic people for caring so much about the mere surface of things, and being so little interested in what lies behind them. But when men get wiser they will learn how foolish all this is, and that both these kinds of people are necessary, for it takes all sorts of people to make a world.

#### THE PEOPLE WHO THINK BY SOUND RATHER THAN BY SIGHT

Now, there is another great type of mind, and this is found in two very different kinds of people; but they both agree in that the associations for which their brains are best fitted do not go so much by the eye as by the ear. All the other people, on the whole, may be classed as visualisers, and their way of thinking is mostly visualising, or making visions, old or new, in their minds. But in these other people we are speaking of the power of visualising is much less strong, and their chief way of thinking, that is to say, of forming associations, is by sounds, and not by sights. In such an animal as the dog, associations go chiefly by smell, but in human beings

smell has lost its importance, and only sounds and sights need be considered. So these people who think and associate mostly by sounds are called *auditives*.

**HOW WE HEAR IN OUR MINDS THE SOUND OF A WORD THAT WE SEE**

Man has learnt to do many wonderful things, and especially he has learnt to write down marks which stand for sounds, and this invention of written language, and the making and reading of books, really belongs to the working of this kind of mind, though actual hearing and sound may not come in. Nevertheless, we imagine the sounds of the words as we read them; and so, though we are using our eyes to read, and do not seem to be using our ears at all, yet the processes that go on in the brain and in the mind are practically the same as those which go on when we listen to a person speaking. So we can understand what kinds of minds the *auditives* have.

Some of them, the musicians, are deeply interested in sounds just as sounds; they remember tunes, and can reproduce them; they can even make new tunes; they can imagine in their minds how one kind of instrument sounds with another, or how certain notes will sound when they are played together, or one after the other. So, just as the artists make pictures, these people make music. It is as easy and natural for a musician to make a tune, and perhaps as impossible to put a machine together—much less to invent a new one—as it is easy for the engineer to invent a machine and impossible for him to invent a tune.

Of course, we are not saying that many people do not combine more than one of these powers of association. There are such people, and they must be considered to be very fortunate.

**THE HIGHEST KIND OF MIND THAT A MAN CAN HAVE**

We now come to what is, on the whole, the greatest of all the types of mind, and this belongs to the people whose interests are naturally with words. In them the human mind is at its best. When a person speaks, they are not so much interested in the movement of his lips and eyes as the artist is, nor yet in the tones of his voice as the musician is, but rather in the meaning of what he says. Just as a musician remembers

tones and tunes, and the artist remembers colours and forms, so these people remember words and phrases, and the ideas which words and phrases express.

The one type of men can associate lines together to make a picture; another puts notes together to make a tune; and the third puts words together to make a thought. Now, pictures may be just the same as thousands of pictures before them; tunes may be just the same as many tunes before them; and so, of course, may sentences, phrases, ideas, and thoughts.

But the small number of great people whom we call original, and who make the progress of the world, can not only remember and reproduce the old associations, but they can make new and original ones; and so just as we have great pictures, great statuary, great buildings from one type of mind, or great music from another, so from this last type of mind great thoughts will come.

**THE WONDERFUL MIND OF THE POET, WHO DRAWS LIFE FROM THE SOUL**

Every now and again there comes into the world a person whose mind combines both varieties of the auditive type. He not only has ideas made by associating words, but he is also concerned with the musical quality of words, and takes pains to put them together so that they have a pleasant rhythm.

This man is a poet. The greatest poets are visualisers as well; they can see great pictures in their minds, as Milton saw pictures when he wrote "Paradise Lost"; or they can recall the appearances of Nature, as when Wordsworth wrote his poem about the daffodils. Their minds are so rich, and have so many powers of association, that they can compare things together which other people would not think of comparing.

All these qualities added together, perfectly blended, and governed by something which is deeper than all associations, and which we can only call the soul, went to make the few sublime poets of the world, who thought and saw and heard and felt and sang, remembered and prophesied, and did all these things so well, and blended them so wonderfully, that their poetry must be called the greatest and most glorious of all the varied products of the human mind.

The next part of this is on page 5025.



## FAMOUS MAKERS OF ROME

In all the world there is no other place so wonderful and yet so sad as Rome. It is wonderful beyond all other cities because of the relics of past power and grandeur which it preserves. The sight of its ruined splendour makes us think of that story of the finding of ancient Babylon, the mighty city of which the Bible tells us so much, and which was the greatest in the world when Rome was not yet built.

But Babylon perished, and for thousands of years lay buried under the sand and soil swept over it by the winds. And one day a man of our own time discovered the vast mounds of rubbish under which it lies. It was deserted, save for a few savage tribesmen who pitched their dirty tents there, and pastured their lean flocks. We read about Babylon in that part of this book that begins on page 497.

Rome has not fallen into decay like Babylon, for it is still a populous city. Its population is, however, only about a third of the population of the Rome of two thousand years ago, and the people who now live in Rome do not add to the glory or interest of the city. They depend for their living very largely upon people who visit Rome from other countries. Most of them are poor, not over-clean, and not well educated,

although, of course, there are many who are both cultured and wealthy. Some-

how we cannot but feel that these people ought not to be there. We want to picture Rome as peopled with the great men and

women of olden times who made it the most famous city in the whole world, the home of the people who ruled over all the earth that was known in their day. It makes us sad to see old-time palaces used as rag-shops and stables, shops and offices and apartments, and so forth.

Wonderful as she still is, Rome lives, and must live, upon her past—a past such as no other city possesses. We see on the pages beginning at 413 and 527 how Rome came to be the greatest power in the world. We learn there, also, that the power of the emperors declined, and that the power of the Church increased, so that the Church became ruler of Rome. This great city, where, in the early centuries, Christians suffered such frightful tortures, became the capital of Christianity.

Rome was attacked, as her strength declined, by strong and barbarous people. The popes managed to impress the Christian faith upon the conquerors, and were themselves

CONTINUED FROM 4715



strengthened by these dreaded masters of Rome. In course of time the popes ceased to be merely the heads of the Church. They became rulers; they helped to settle the affairs of practically all nations which professed Christianity. It is important to remember this, for only by so doing can we understand how Rome owes her second life to the popes.

#### THE MAGNIFICENCE OF ROME UNDER HER OLD PAGAN RULERS

Rome reached her greatest grandeur under pagan rulers. They had temples and theatres and circuses such as the world has never seen since; they had huge and wonderful temples to all their gods and goddesses; they had lordly palaces and villas to dwell in; they had places of entertainment in which 250,000 people—more than the population of a modern city like Louisville—could be seated to witness the chariot races. Their noblest statuary was erected by the sculptors of antiquity, to glorify conquerors or to celebrate the gods whom the people worshipped. Never was there so splendid a city, before or since, as Rome in the height of her power under the pagan emperors and consuls.

Naturally, then, when the popes, who were the heads of the Christian Church, became rulers of Rome, they were anxious that Christian Rome should celebrate her faith as generously as pagan Rome had. And pope after pope commanded the greatest artists in the world, sculptors and painters, to convert heathen temples into Christian churches, to build new churches, and to make the city beautiful in the eyes of those who worshipped God.

Much of the old Rome remained, and still remains, for her barbarian conquerors could not overthrow and carry away all the vast monuments to bygone greatness; and it is these relics, of those wonderful ages which make Rome to-day such a sad, yet fascinating, spectacle.

#### THE ARTISTIC GLORIES OF ROME THAT ARE UNMATCHED IN THE WHOLE WORLD

But for the beauty lavished upon her in Christian days we must go into the churches, into the galleries, and into the Vatican. There we can see wonders of art that are unmatched in the whole world. It would be hopeless to attempt anything more than a sketch of a few of the men who have made the beauties

of Christian Rome. Books upon books have been written on the subject, and many more might be written without wearing out the theme.

It will serve as an introduction for us merely to glance at some of these men whom the re-awakening of art in Europe gave to Rome for her adorning. How to give each man his due is the difficulty. The vast Vatican palace, one of the chief glories of later Rome, took hundreds of years to build. If we could tell its story, and the story of the men who worked to bring it to completion, we should tell the history of the politics and art of Europe during all that time.

It stands where the ancient Romans used to gather to worship an old oak, where, later, the dreadful Caligula built a huge circus; and hereabouts this villain would delight himself at night by walking forth and slaughtering distinguished people—senators and Roman ladies whom he met on his way.

#### THE POPE WHO DREAMED OF THE GREATEST PALACE IN THE WORLD

Here, too, Nero afterwards had his circus, in which he nailed Christians to crosses, disguised some as wild beasts and had them worried to death by dogs, and covered others with pitch and set fire to them, so that they might make living torches to light up his night's amusement in the circus.

These days passed, and the Vatican became the residence of the popes towards the end of the fifth century, though during the whole of the Middle Ages the papal residence was at the Lateran. In 1309 Innocent III. began to rebuild the Vatican as the settled home of the popes. He was the powerful pope who tried to take England away from bad King John, and made the latter own himself the servant of the pope.

The work at the Vatican went on from pope's reign to pope's reign, until the ambitious thought entered the mind of Nicholas V. to make the Vatican the greatest and most magnificent palace in the world. He did not live to see his scheme completed, but his successors carried it on. To-day the Vatican is the greatest and most splendid palace in the world, and contains the richest treasures of art and literature ever gathered together in one centre. It covers an area of 13½ acres,



## FOUR ARTISTS WHO MADE ROME BEAUTIFUL



Michael Angelo was wonderfully influenced by a pious lady named Vittoria Colonna. She was the chief inspirer of his poetry and pictures. Her death, in 1547, left the artist broken in health and spirits. Here we see the lady and the artist at the foot of his great statue of Moses.



In this picture the famous artist Raphael, of whom it has been said that he would have been a great painter even if he had come into the world without hands, is talking to La Fornarina, a lady with whom he fell in love, and to whom he wrote some beautiful sonnets.



Benvenuto Cellini was the greatest of the Italian metal-workers who lived in the golden age of art. He was an extraordinary combination of the artist, soldier, braggart, and author, but his artistic workmanship in gold and silver has never been surpassed. He is shown presenting some of his work to Pope Clement VII.



Like so many Italian artists, Salvator Rosa was also a poet, but his verses often made fun of great people, and their anger drove him from Florence for a time. Although he was full of mirth, his landscapes are gloomy, and portray wild and savage scenes. In this picture he is showing a painting to one of his patrons.

of which about six are occupied by the 20 courts, 200 staircases, and about 1,000 chapels, rooms, and galleries that go to make up this vast building.

The popes who built the Vatican will always be remembered as among the men who helped to make Rome beautiful, and we may here note the names of some of them. First there was the powerful Innocent III., who began the rebuilding; followed by Nicholas III., who began the scheme of enlargement. John XXIII. added to the security of the palace by connecting it by a passage with the fortress of St. Angelo.

Nicholas V., the pope with the master-builder's mind, planned the scheme for making the Vatican what it has since become—the home of the pope and the cardinals, the offices of the Church, the meeting-place of all her pilgrims, the starting-place of all her missionaries. The work which began under this pope was carried on by Alexander VI. Paul II. made further extensions, and then Sixtus IV. built the world-famous Sistine Chapel, so called after his name.

**THE CHURCH OF ST. PETER THAT COST MORE THAN FIFTY MILLION DOLLARS**

It is necessary now to turn to the building of the huge church of St. Peter, Rome's greatest sanctuary, the church dearest to Roman Catholics, as the Vatican is the palace most revered by them. The building of the church was begun in 1506 by Julius II., and extended over 176 years. The cost of the main building alone was fifty million dollars. So hard was the struggle to get money that two of the popes were driven to methods which roused the indignation of Martin Luther and others, and led to the Reformation.

St. Peter's at Rome, built to be the greatest church of the Christian world, led to the first great division in Christendom, and brought into being the Protestant Church. Now that it is finished, St. Peter's is a building unmatched in splendour for its marbles and statuary and paintings, and for the richness of its decoration in jewels and precious metals. We see something of the magnificence of this wonderful sanctuary from the pictures on page 3019.

But Rome, as a city, suffered by the building of this mighty cathedral. Nearly all the marble with which the interior is decked was taken, not from

modern quarries, but from ancient buildings, many of which were levelled to the ground for the sake of only one or two pieces. However, be its history what it may, Rome has the richest and most remarkable church in history, the church which cost most and took longest to build. It also costs more to maintain than any other church.

**THE GREAT TREASURES DESTROYED TO MAKE ROOM FOR ST. PETER'S**

The present cathedral occupies the place of an earlier one. The older church was rich beyond comparison in works of art, which had taken long to gather together, but when the first building perished these were destroyed, either deliberately or through carelessness. This is a crime for which lovers of the beautiful cannot forgive Pope Julius II., who directed the destruction of the old church to make way for the new.

The Vatican and the great cathedral and the hundreds of churches and the richly stored museums and galleries are the works which have been carried out under the popes and the men who have lived in the times during which the popes have been masters of the Eternal City. Now we may turn to the story of some of the artists who have worked for the glorification of the city. Needless to say, the great men of whom we read in our stories of the Makers of Florence and Venice, beginning on pages 2779 and 1249, found their influence extended to Rome.

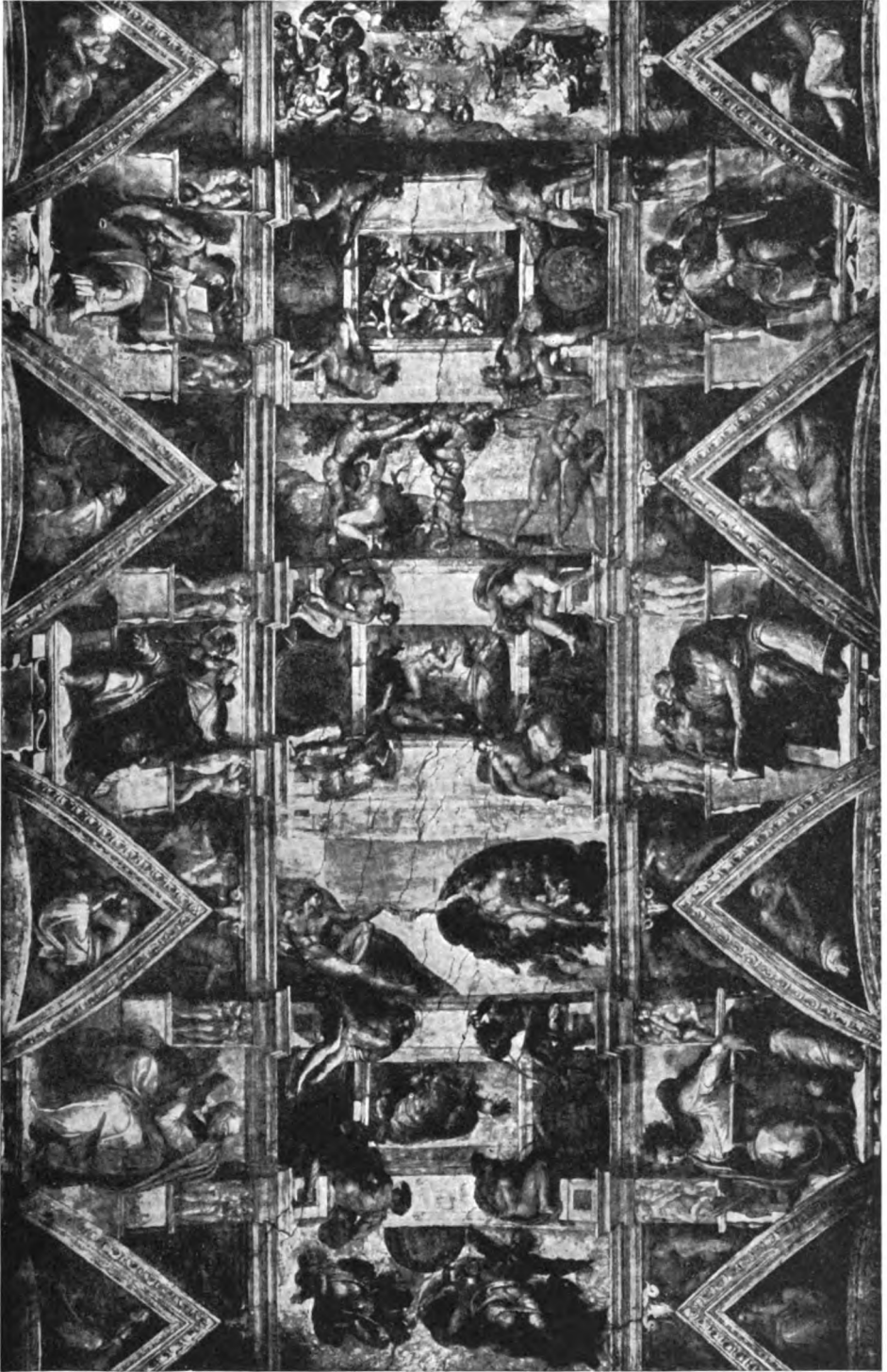
Fra Angelico—about whom we read on page 3987—made the world grateful to him, not alone for the sermons which he preached with his brush; he inspired men with his own ardour and made them great painters too.

**FABRIANO, THE HAPPY ARTIST WHOSE PICTURES ARE FULL OF JOY**

One of these was the warm-hearted Gentile da Fabriano—of whom we read on page 1256—who was born about the year 1348, at Fabriano, the town from which he took his name. He was nearly forty years older than the painter-friar. Nevertheless, it was from this holy man that Fabriano learned, though he may first have studied under Allegretto de Nuzio.

Some of his finest work was done for Florence and for Venice, the latter city giving him a pension and a title of nobility. Fabriano was well advanced in years when his fame reached Rome,

## MICHAEL ANGELO'S WONDERFUL CEILING



The magnificent ceiling of the Sistine Chapel, painted by Michael Angelo, is one of the greatest glories of Rome. This picture of it gives some idea of the grandeur of the decoration, which cannot be really suggested on paper.

and caused Pope Martin V. to summon him thither to help in adorning the fine church of St. John Lateran. His pictures express the joyfulness of spirit by which he was always animated. He had something of the happy childish spirit which lives in the delightful pictures of the saintly Fra Angelico.

Among the famous artists of Florence of the early fifteenth century was Fra Filippo Lippi, who, born about 1406, lived all his life in Florence. His son, Filippino Lippi, who was born about 1458 and died in 1504, was only a child when his father died, but the genius of the sire descended upon the son, and the fame of the Lippi family was carried by Filippino to Rome, where to this day some of the glories of his art are to be found in the frescoes which he painted in the Minerva church to illustrate scenes in the life of St. Thomas Aquinas.

**THE MASTERPIECE OF BOTTICELLI THAT WAS HIDDEN AWAY**

But a greater artist than Filippino studied in the school of Fra Lippi. This was Sandro Botticelli, born at Florence in 1446. He was to have been a goldsmith, and was apprenticed to one named Botticelli, and took that name, for his own surname was Filipepi. Happily, he was passed on to Lippi, and then he caught the spirit of his master, and improved upon it. In his youth he loved the myths and legends of classical stories, and painted his ideas of them upon immortal canvases. Such was his "Birth of Venus" and "Venus with the Graces." But religious art presently called him, and two of his devotional pictures are among the greatest artistic glories of Florence to-day.

The manner in which he painted did not always please the critics, for one of his pictures was declared to be heretical, and had to be hidden away. Nevertheless, he was called to Rome, and gave the best of his life to painting three glorious frescoes in the Sistine Chapel at the Vatican. He found time to illustrate the great work of Dante with engravings of exceeding beauty. Large as were the sums he earned, his declining years were passed in poverty, relieved only by a pension from the Medici family. To make matters worse, he was stricken with lameness and blindness, and he was quite unable to follow the art that he loved so much.

We now approach the company of giants, a period of marvellous artists, sculptors, and painters. First let us take Donato Bramante, who was born near Urbino in 1444, and died at Rome in 1514. He was at school in Milan, where he studied geometry and perspective, sciences which in those days were not at all well understood by even the great artists. Bramante, therefore, is of much importance to us in history for the pains that he took to spread the study of these sciences, for by so doing, as we can all easily understand, he introduced greater exactness and truth into his work.

**BRAMANTE, WHO LAID THE FOUNDATIONS OF ST. PETER'S**

Bramante was one of the best painters of his day, but he laid aside his brush for the pencil and compasses of the architect. Invited to Rome by Pope Alexander VI., and working on under Julius II., he first built great galleries for the Vatican, and then designed and laid the foundations of St. Peter's. He meant to make the cathedral in the form of a Greek cross with a noble dome to it, but the work had been only eight years in progress when he died.

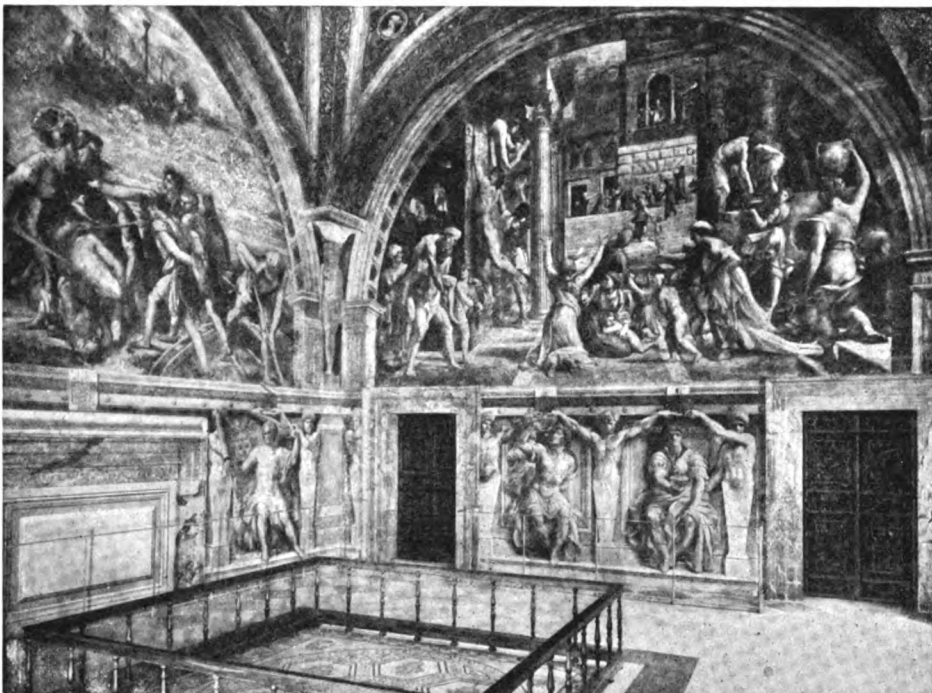
At this time three of the greatest geniuses of the world were reaching the height of their glory. One was Leonardo da Vinci, who had but little to do with Rome; but he was one of the three greatest figures there for a short time of his life. The story of his work is told on page 757, and we also read about him on page 4586, so that now we need only remember that he was one of the most fertile geniuses that ever lived.

**MICHAEL ANGELO, THE GREATEST ARTIST IN AN AGE OF GREAT ARTISTS**

A younger man than Leonardo was Michael Angelo—of whom we read on page 4161—younger by twenty-three years, but who was eight years older than Raphael. With these three men for rivals, we may rightly say that this was an age of giants. Michael Angelo and Leonardo were rivals for a work at Florence, resulting in each producing a world's masterpiece; and they were rivals again at Rome.

It is strange that the same age should produce two such men as Leonardo and Michael Angelo, for in many respects they were alike. They towered above nearly all their fellows in several of the arts. Michael Angelo was one of

## THE FAMOUS WALLS OF THE POPE'S PALACE



This is one of the most beautiful rooms in the Vatican. It is one of four magnificent apartments called the Halls of Raphael, because that artist painted the walls. The picture directly before us shows the burning of Rome in 847



The Sistine Chapel is the grandest apartment in the Vatican. The magnificent ceiling by Michael Angelo and the wonderful wall-paintings almost bewilder the spectator by their beauty. When Pope Paul VI. complained about Michael Angelo's great fresco of the Last Judgment, that faces us in this picture, the artist replied: "Tell his Holiness to trouble less about the amendment of pictures and more about the reformation of men."



the finest sculptors that ever lived; he was one of the greatest painters; yet he was also so eminent a poet that his verses placed him in the very forefront of poets of a particular type.

#### WHEN OLD MICHAEL ANGELO LOOKED BACK UPON HIS WORK AS A BOY

Angelo was born at Caprese, Italy, March 6, 1475, and died at Rome, February 18, 1564. His father, a man of good family, thought it degrading for his son to follow the profession of a painter; but the boy's whole affections were given to art, so he was apprenticed to a painter, when he so soon became expert that at fourteen he was able to correct the work of his master. Long, long afterwards, when Angelo was an old man, they showed him some of the paintings which he had done when a little boy. "Ah," he said, "I was a better artist then than I am now."

His life, though so distinguished, was full of vexations. While he was yet young, a jealous fellow-apprentice, in a quarrel, picked up a mallet and struck Angelo with such force as to crush his nose, and disfigure him for life. By the time that he was thirty-five the fame of Angelo had spread throughout Italy, and he was called to Rome to undertake the gigantic tomb, or mausoleum, in which the then reigning pope, Julius II., intended to be buried. This vast work engaged Angelo on and off for practically the remainder of his life.

He had been only two years on this work when the pope bade him undertake the decoration of the ceiling of the Sistine Chapel. Here was a task for one man! The ceiling is vaulted, 150 feet long and 50 feet broad. Unaided, Angelo carried out the work in little more than four years. No single work in modern art can compare with this.

#### A CEILING WHICH IS ONE OF THE WONDERS OF THE WORLD

Some of the figures on the ceiling are grand and terrible, others are exquisitely soft and beautiful, and the whole is full of deep feeling, like some great poem in figure and action. This tremendous work has been the wonder of the artistic world ever since it was finished.

While he was at work on it, Angelo gave every thought to it. He would have no help, he would have no on-lookers. The chapel was closed, and he hated to see even the pope himself

there. One day the pope did creep in on tiptoe to see how the work was progressing. The painter saw him, and angrily let fall some tools with a crash near where the pope was standing. The pope fled, but was so angry that Angelo had to leave Rome until the storm blew over.

It must have been about this time that Angelo carved one of his famous statues for Florence. For years and years there had stood in a backyard in Florence a great misshapen block of marble which another sculptor, long before, had spoilt in trying to shape from it the figure of a giant. Angelo was asked if he could carve a figure from it. He said that he could, and the magic of his chisel won from the huge block the great statue of David, with which the world is now familiar. Another famous work is his fine statue of Moses, which we see on page 4947.

#### HOW RAPHAEL WAS INSPIRED BY THE WORK OF MICHAEL ANGELO

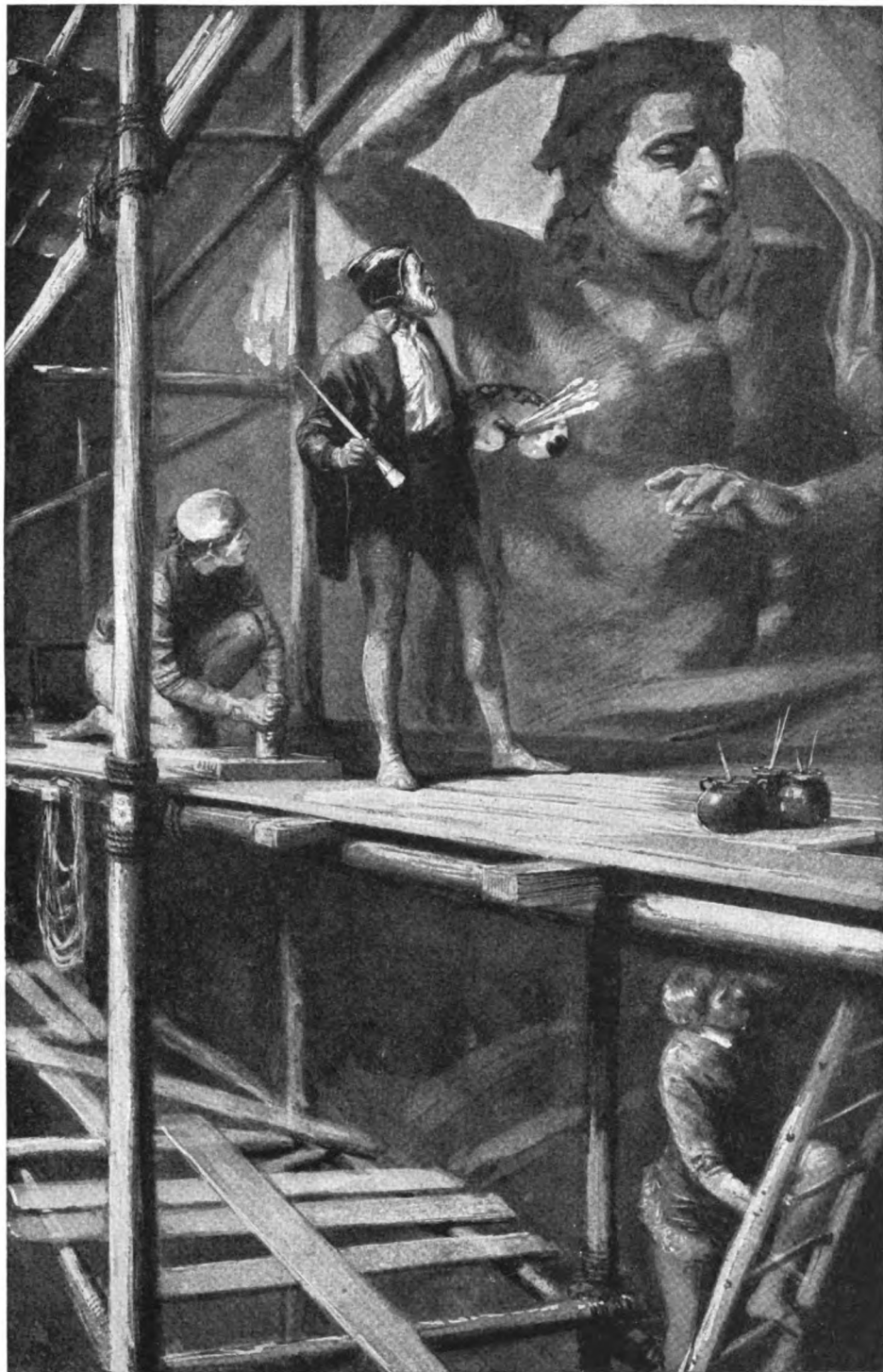
Still, he was not at liberty to go on with his work at Rome, for a war occurred in which Florence was besieged, and Angelo was set to work to fortify the city against the enemy. When he at last settled down in Rome again, he resumed the work on the tomb of Pope Julius. He was eventually made architect for St. Peter's Cathedral, and designed the great dome.

He never married, but he loved a beautiful marchioness, and it was his love for her which inspired some of the most beautiful of his poems. He died when nearly eighty-nine years of age. To the last, though he was proud and reserved in his dealings with other men, he was always a humble student of his art. "I am still learning," this great man used to say right up to the time of his death.

One of the effects of Angelo's work was to inspire Raphael. The latter, born at Urbino in 1483, was only twenty-five when, famous for his work at Perugia and Florence, he was invited by Julius II. to Rome. He had already come under the influence of Michael Angelo and Leonardo, but apparently it was not until Angelo's frescoes in the Sistine Chapel were unveiled that he felt the full effects of the master's genius. It carried a message and an inspiration to him that bore wonderful fruit. Not



## MICHAEL ANGELO AT WORK IN THE VATICAN



None but Michael Angelo could have conceived and painted the great picture of the Last Judgment, that stands out instinct with power and majesty on the wall of the Sistine Chapel. It never ceases to astonish men.

that he copied Angelo. He was too great to be a copyist. He was the greatest painter that ever lived, and did not need to copy.

But we may be inspired by others less expert than ourselves, and though Raphael was a greater painter than Angelo, it was owing to the influence of the latter that there burst forth that light which was to illumine the remaining days of the young man.

The pope made him master architect of St. Peter's, the post to which, at Raphael's death, Angelo succeeded. He was also the foremost painter in rank as well as in achievement. He painted the famous frescoes at the Vatican, glorious pictures from Scripture, pictures for the tapestries in the cathedral at Arras, now world-famous, portraits, studies, sketches, and so on. No man ever produced more. He seemed to feel that he was not to live long, and that he must devote every hour to his work. It was well for mankind that he did, for he died when only thirty-seven years of age.

**A GOOD MAN WHO WORKED HARD AND A BAD MAN WHO MADE BEAUTIFUL THINGS**

In his all too short life he gave to Rome, and through Rome to the world, the most marvellous collections of paintings ever done by human hand. He was mourned not only as a great artist, but as a greatly beloved man. Everybody admired him, and so gentle and sweet was his nature that it was said that the very animals loved him. Raphael's work is described on page 778.

Quite a different type of man from the men already mentioned was Benvenuto Cellini—of whom we read on pages 1223 and 4161—the goldsmith and sculptor, who won such fame from his work in Rome during the time of Clement VII. and Paul III. He was born in Florence in 1500, and died there in 1571, after wandering all over Rome and France.

His work was very beautiful, and on this account he was forgiven many crimes for which others would have been executed. He lived in rough, lawless days, but Cellini was worse than the average lawless man of his day, and thought nothing of slaying anyone with whom he quarrelled. He wrote the story of his life, and it is considered to be one of the most

remarkable works of its kind in the whole of the world's literature.

While Cellini was swinging his sword and plying his tools, his very opposite in character, Sebastian del Piombo, was quietly at work with his paintings and portraits. He was a native of Venice, it is supposed, and was born in 1485. A friend of Michael Angelo, it is believed that he had that great man's help in painting his "Resurrection of Lazarus," which now hangs in the National Gallery in London. He was a good, pious man, as well as a distinguished artist, and towards the close of his life became a priest.

**CLAUDE LORRAINE, THE GREAT PAINTER WHO COULD NOT BE A BAKER**

Now we go forward to the seventeenth century, and in its first year we come upon a baby named Claude Gellée, who, being born at Chamagne, in Lorraine, is known to the world as Claude Lorraine. His father was a humble pastrycook, and as Claude grew up he wished to make him a pastrycook too. But the boy could not be made to learn. "He will never know how to heat an oven or bake pastry," his father grumbled.

Claude's brother was a stonemason, and thought the little chap would never be clever enough to follow that trade. "He's so silly that you had better make a priest of him, father," he said.

But study of the ordinary sort was beyond Claude. He would go into the fields and gaze with wonder and delight on all he saw from dawn to dusk, but he could not mind a baker's oven nor use a mason's chisel. He suffered terribly at home, so one day, meeting a party of Flemish artists who were going to Rome to study, he decided to join them, and was allowed to act as their servant.

**HOW CLAUDE LORRAINE WAITED FOR HIS OPPORTUNITY**

Arrived in Rome, he took service with an artist, grinding his colours and making himself generally useful. He was not lazy, as his father had thought; here in the atmosphere of a studio, with all he loved, no day was too long for him, for he was now able to study art. After some years of this life, he wandered forth on his travels, studying wherever he went. Returning again to Rome when twenty-seven, he started his career as a landscape artist.

## RAPHAEL, WHO GAVE A SOUL TO PAINTING



Raphael gave a soul to Italian art by linking religion and beauty, and a famous writer speaks of his "godlike art." All his figures are aglow with warmth and life. Raphael is here painting one of his Madonnas at Rome.



Raphael was at the very height of his fame and genius when he caught a chill, from which he died, in his thirty-seventh year, surrounded by friends and patrons. His death put the whole of Italy into mourning. The photographs on these pages are by the Photochrome Company, Anderson, Alinari, and others.

Progress was slow but sure, and at the end of ten years he was commissioned to paint a picture for Cardinal Bentivoglio, who introduced him to Pope Urban VIII., and this made his fortune. All good patrons of art were now anxious to have his works, but he would not readily part with them.

For one picture the pope offered him as much gold as would cover the canvas on which the picture was painted, but Lorraine would not sell it. Illness marred his later years, but to the end Lorraine was diligent and faithful to his art, and a warning to all fathers who think their sons too idle and stupid even to be pastrycooks or stonemasons. He died in 1682.

#### **SALVATOR ROSA, THE MERRY MAN WHO PAINTED SAD PICTURES**

Another famous landscape painter of this time was Salvator Rosa, who was born at Arenella, near Naples, in 1615, and died in Rome in 1673. He received very little instruction, but wandered about studying Nature in her wildest moods and aspects, and painted pictures strong and gloomy and original. That the pictures should be gloomy is strange, seeing that his nature was so mirthful. He was a brilliantly talented man, whose verses made fun of the great people of the time without fear or favour.

A painting called "Tityus Tortured by the Vulture" made Rosa famous at twenty-three, and he became the centre of a group of distinguished friends. But his verses got him into trouble, and he had to flee to Florence on pain of death.

#### **THE BOY CANOVA, WHO MODELLED A LION IN BUTTER**

We must close our brief sketch of the artists who have helped to maintain the artistic fame of Rome with the story of Antonio Canova, the father of a new school of sculpture. He was born at Possagno, in Venetian territory, on November 1, 1757, and died in Venice on October 13, 1822. His father died when Antonio was only three years old, and the child was left to the care of his grandparents. A grand old man was his grandfather, who delighted to teach the child to model, and to indulge his fancy in the little workshop where the old man toiled as a stonecutter. At nine years of age, Canova, in order to better his education, was placed in

the household of a nobleman, where he soon distinguished himself. There was to be a banquet at the house, but one of the chief ornaments of the table, a great fancy dish, failed to arrive. The host was in despair, but little Canova beautifully modelled a lion in butter, with which everyone was delighted. His master was so pleased that he sent the boy to receive lessons in sculpture. Soon, however, the lad was left to look after himself.

In the morning he studied in the academy or galleries. In the afternoon he worked for a sculptor. In the evening he read. Then he set up a little workshop in a cell under a monastery, and for four years he toiled and studied. At last he produced his first statue, and it set all the great art critics wondering. The Venetian senate sent him to Rome to study when he was twenty-three years of age.

Canova had carefully studied all the ancient classical statuary that he had seen, and he tried, while true to the best old traditions, to give his own work something of the charm of his own mind. It was a new and daring style, and in Rome everybody scorned it.

#### **WHAT CANOVA SAID ONE DAY AT THE BRITISH MUSEUM**

But Canova was quite undaunted. For twenty years he worked away in extreme poverty at his ideal, and he conquered, in spite of all jealousy, contempt, and rivalry. His work became one of the glories of Italy.

It was to him that Englishmen turned when the critics condemned the glorious Elgin Marbles at the British Museum. Canova went to London to see them, and declared them to be among the finest examples of Grecian art in the world. And as he looked upon these masterpieces of ancient days, the great sculptor said, in his modesty, that, after seeing these, he felt that his own work had been a failure.

Happily, the world does not agree. The world accords to Canova a high place in the assemblage of great geniuses who have helped to keep Rome in her place as the queen of all the cities—a glorious queen for what she was in the days long past, and supreme in beauty and wonder from what more modern effort has made her.

The next Men and Women begin on 5217.



## HOW THE TRAIN WAS SAVED

IN a wild part of West Virginia there lived a poor old widow in a roughly-made log-hut, miles away from any neighbours and situated on the edge of a chasm. The Baltimore and Ohio Railway had its track close by, and ran across a roughly-built wooden bridge over the yawning chasm.

One windy day in March the snows were melting on the mountain heights and the river that flowed through the gorge was filled with an icy flood of melted snow. As the day lengthened the waters grew noisier, and their ceaseless roar made the old woman and her daughter uneasy. They were reluctant to go to bed at all, but at last did so in fear and trembling.

About midnight a crash caused them to start up in terror. Clinging to each other, they crept down to the edge of the gorge, and found that the bridge had been carried away.

No sooner had the old woman realised what had happened than the awful thought came to her that the express would be due in half an hour. There was no one, no signal-box, no telegraph, to warn the approaching train of the danger that lay before it.

Was there *nothing* she could do; no way by which she or her daughter could prevent the awful destruction that awaited the coming train?

CONTINUED FROM 483



Stop! There was one thing, one thing only—a light! The engineer would see a light, though no shouts would seem more than a faint whisper in the roar of the raging wind. But where was she to get a light? In the hut she had just

half a candle, and if she took that on to the line, the rain and wind would put out the light directly. In her poverty she had neither lamp nor lantern, and the winter fires had almost exhausted her pile of sticks gathered in the woods.

Searching anxiously round the little hut, her eyes rested on the old wooden bedstead and two wooden chairs. These were the only things she could burn; they were dry and old, the posts of the bed worm-eaten, and, if sheltered from the wind, they would stand a chance.

There was not a moment to lose if the train was to be saved. With trembling and eager hands the two women chopped and cut at the bedstead until it lay on the floor in pieces; then, carrying these in their arms, they climbed up on to the line, and the two piled up the wood in the middle of the track, some little distance back from the gaping chasm, in the most sheltered spot they could find.

With trembling hands the old woman struck a match and put it to the pile of furniture. To her joy, this

caught on fire; just in time, for as it began to blaze up, the rumble of the distant train became very evident. How eagerly mother and daughter watched that burning pile, hoping and praying that the engineer would see it in time to stop the train. The mother took off the red skirt she wore, tied it to a stick, and hurried up the line, waving it about in the light from the fire, while the daughter flourished a burning post, as shown in the picture on page 4957. Nearer and nearer came the roar of the train; it was rounding the curve;

they could see the red light in front of the engine. They redoubled their efforts, and shouted "Stop! Stop!"

Gradually the train slowed down, and came to a stop close to the blazing pile. The engineer's keen eyes, accustomed to see far ahead, discovered the dangerous chasm and the empty space where there should have been a bridge, and as his eyes travelled to the burning furniture and the figures of the old woman and her daughter, he recognised the act of courageous sacrifice that had come from a brave heart.

## THE MAN WHO THOUGHT OF HIS COMRADES

**D**URING the construction of the railway between Manchester and Leeds, in England, a number of tunnels had to be bored. Shafts, some of them two hundred feet deep, were sunk from the hill-tops to the tunnels, for purposes of ventilation.

Among the men employed on this work was a navvy, whose duty was at the top of the shafts. He had to raise the tubs filled underground, and return them empty to the other workmen. If any mishap occurred, such as the breaking of a chain or the falling of a piece of loose rock, he had to warn the men below, so that they could retreat out of danger.

One morning, while he was thus engaged at one of the deepest shafts on the line, his foot slipped, and he felt himself falling towards the narrow

channel, against whose ragged sides or on whose rocky bottom he knew he must be hurled and killed.

In that terrible moment, however, he did not lose his presence of mind. His first thought was of his comrades. If he cried out for help, the men below would rush out of their shelters to see what was the matter, and even if they succeeded in saving him it would be at the tremendous risk of losing their own lives.

So the man, with a chivalry as great as that of any knight, gave in his usual voice the signal, "Look out below!" And, secure in their retreats, ignorant of what was happening, the workmen below heard the crash as their comrade fell; and in his death, by suppressing the instinct to cry for help, he became the saviour of his fellow-workmen.

## A RACE WITH DEATH

**I**T was the year 1864, and it had been raining torrents for days in the valley of Williamsburg. One spring morning in May the sun shone out of a blue sky over a rain-soaked earth. The rain was over and everybody came out to greet the sunshine. The men went to work in the fields, and the children played on the door-steps, or threw stones in the river, swollen with the rains, which roared onward between its banks. Suddenly everybody paused in their work or play with a nameless horror clutching at their hearts. A dull, murmuring sound was heard among the hills. Then the hush was broken by the clatter of horse's hoofs and the

shouts of a man bearing down through the valley on horseback.

On he came with wildly waving arms, and his hoarse shout spread panic through the valley: "The dam has burst! To the hills! To the hills for your lives!" The terror-stricken inhabitants, not pausing to look behind them, fled to the hills. They were not a second too soon, for a brown, curling flood swept roaring down the valley in fearful pursuit of the brave young farmer on horseback. At last Collins Graves drew his panting horse to a standstill on the high ground at the foot of the valley. His fearful race with death was over. He had saved the people.



## "PARTNERS"

"COME, buck up, Dannie, old chap."

Little Mackie seated himself upon the side of his comrade's cot and laying down his crutches, anxiously viewed the tousled head buried face downwards in the pillow. "Of course it's rotten luck that you have to stay in bed all the time when we other chaps can go hopping round, chipper as you please." Mackie glanced at his crutches radiantly. "But then you know," he continued, "the doctor said you could sit up by-and-by. Then you and me'll go into partnership." A pale cheek emerged partially from the pillow. "I'll be a bootblack on the Square; we'll be partners and go halvers in the profits."

"But what can I do?" came a small voice with awakening signs of interest.

"Oh, you'll be lots better by that time and you can sit in a wheel-chair behind a little stand and sell candy."

"That'll be nice," Dannie sighed, contentedly.

"Of course, it'll be nice," returned Mackie confidently, "and don't forget, we'll be partners."

That night when the lights had been turned down and the two little fellows lay side by side in the small white cots in the hospital ward, a great noise and scurrying through the halls was heard suddenly. Several of the children sat up excitedly and inquired what was the matter; but their nurse told them it was nothing.

Little Mackie lay back on his pillow and listened attentively to the queer noises in the halls.

"Hey, Dannie, partner," he ventured at last in a whisper. "Nurse says there's no danger, but if there is, don't you be scared. I'll look after you."

Suddenly the noise grew louder, and a wild cry rang through the corridors of "Fire! fire!" Then three firemen rushed into the ward and caught up the nurse and as many children as they could carry under their arms, and disappeared.

Mackie and Dannie were left alone in the ward. They could hear the snapping and crackling of the flames and presently the smoke came pouring in through the door in great puffs.

"Mackie!" cried Dannie, excitedly struggling to sit up. "Run! Run! Don't wait for me! They mayn't come back!"

Mackie climbed out of his cot and hobbled over to his chum's bed.

"Quick, Dannie," he whispered hoarsely. "Put your arms around my neck. Now hold on tight. That's right. Now we'll go."

Tap! Tap! Tap! through the smothering smoke the brave little fellow made his way, Dannie hanging to him, his arms rightly clasped about his neck.

Meanwhile, outside the hospital, an excited crowd watched the firemen carry out the children.

"Are they all out?" anxiously inquired one of the managers of the hospital, who had rushed to the scene.

"No, not all," the man half gasped. "There were two little chaps in the lower ward—but I am afraid the flames have cut them off."

"Good God!" said the manager. "Can't something be done?"

As the fireman started back to the flame wrapped building, word spread through the crowd that there were still two children in the building, and a wild, hysterical wail went up, as tongues of fire began to shoot out of the window.

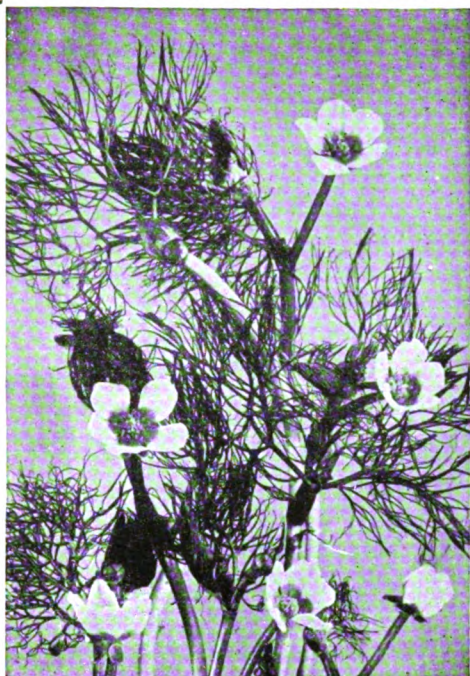
"God save the poor mites," a woman sobbed, "God save them!"

And He did, for through the confusion of noises came the sound of two crutches tap-tapping on the marble floor. Then Mackie staggered out of the doorway with little Dannie still hanging about his neck. Amid the shouts of the multitude, the two were borne to a place of safety, but Mackie had fainted. When he opened his eyes, kind faces were bending over him.

"Where's Dannie?" he whispered hoarsely.

"Quite safe," they reassured him, gently.

Mackie turned over in his bed with a little sigh of deep content. "Me and Dannie are—part—ners," he whispered sleepily as he cuddled down between the cool sheets.



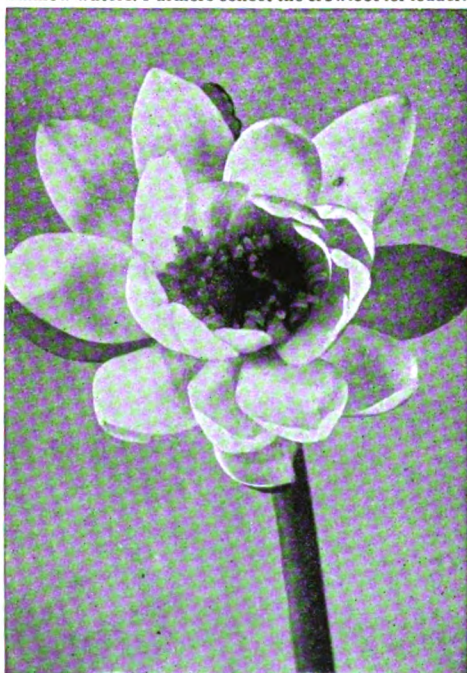
**THE WATER CROWFOOT**

The water crowfoot is one of the buttercups. The flower is white, and often in spring a sluggish stream will be one mass of white owing to the crowfoots growing in the shallow waters. Farmers collect the crowfoot for fodder.



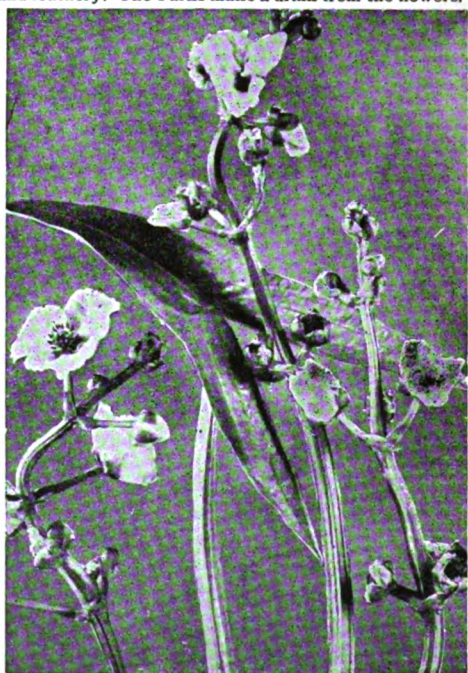
**THE YELLOW WATER LILY**

This flower has an unpleasant odour like spirit, and in England it is called the brandy-bottle. The submerged leaves are thin, but the floating ones are thick and leathery. The Turks make a drink from the flowers.



**THE WHITE WATER LILY**

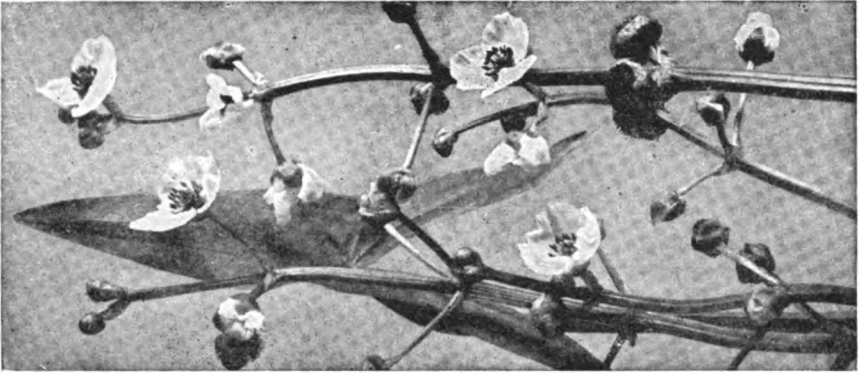
While the flower of the yellow water lily grows an inch or two above the water, the white water lily is found resting on the surface, where it looks very beautiful. Many think that this is our handsomest wild flower.



**THE ARROWHEAD**

No one can mistake the leaf of the arrowhead, for it is in shape exactly like an arrow-head. The plant grows in shallow streams near the banks, and the white flowers, marked with purple, are found in groups of three.





## THE FLOWERS OF THE STREAM

ONE general character strikes us when wandering by the stream in search of flowers—that most of the plants are tall and have comparatively slender leaves. This does not apply to those that float or spread their leaves upon the surface of the water; in these the leaves are very broad and greasy to the touch, so that the water rolls off. The reason for this character is that these plants have their air-mouths on the upper surface of the leaves, and do not wish to get them blocked up by drops of water.

The plants that stand up along the margins of the streams have two reasons for possessing slender leaves. They grow in crowds, and, as in the case of the grasses, the slender leaf allows a greater number to grow in a narrow space because it enables the light from above to benefit all; and as they have all the moisture they need at their roots, there is no need to collect more on broad leaves and convey it to the roots.

The plants whose broad leaves float on the surface of the stream have leaves of a very different shape under the water, where breadth would be of no value to them, and where, in order to obtain enough of the small amount of carbonic acid gas that is dissolved in the water, they must expose as large a surface as possible to it.

CONTINUED FROM 489



This difference between the floating and the submerged leaf is shown well in the water crowfoot. This is a buttercup that has taken to living in water; though it might be more correct to regard the

buttercups of the meadow as having descended from an ancestor that lived in water. When buttercups are grown from seeds, their first leaves are just the shape of the water crowfoot's floating foliage. In spring many ponds and parts of streams are covered with the crowfoot's white flowers.

If we can get a grown-up friend to hook out a plant, we shall find its stems are very long and soft, and from under-water branches there appears to be produced a large number of dark green, coarse hairs. If, now, we put a piece of the plant into a glass vessel of water, we shall see that these hairs are really the fine divisions of the under-water leaf which spread in all directions; while the round or kidney-shaped floating leaves, which are merely divided into three or five broad lobes, are for the purpose of keeping that end of the plant up, so that the flowers can open in the air. These flowers are very similar to those of the buttercups, except that the petals are white.

Before winter comes the water crowfoot has thrown off its floating leaves and withdrawn its living por-

tions largely into the mud, to be safe there until spring, when it will again grow. In the frogbit, which prefers still waters, we have a floating plant, for its roots never reach the bottom. The leaves lie flat on the surface of the water, and are either round or kidney shaped, green above and purplish beneath. The flowers are almost as large as the leaves, with three sepals and three thin white petals.

The frogbit has no stems to pull it downwards to a place of safety, and probably, if it remained on the surface, it might be destroyed when the upper waters were turned into thick ice. So, in the autumn, it sends out short shoots, and at the end of each develops a bud, which falls off and sinks into the muddy bottom, where it lies quietly all through the winter. In spring it wakes up, swells with growth, and rises to the surface, where it soon puts forth a great number of little floating leaves and roots, and flowers in July.

#### **The Water Soldier**

A near relation of the frogbit is known as the water soldier, because all its leaves are sword-shaped, like those of the flag, but their edges are strongly toothed like the edge of a saw. It is a native of Europe, but is frequently seen in aquaria, in which the plants thrive and spread quickly. During the greater part of the year it remains at the bottom. It has flowers like the frogbit, but larger, and when these are formed the plant rises to the surface.

#### **The Water Thyme**

Yet another relation of the frogbit is the water thyme, which may be found in all sorts of fresh waters. It has long, brittle stems that are almost transparent, closely set with short, oblong leaves in whorls of threes. The purplish-green flowers are very small, and consist of three sepals and three petals.

#### **The Water Lilies**

The most showy of our floating water flowers are those of the two water lilies—yellow and white. In many places both may be found in the same water. They are not usually found where the water is more than fifteen feet deep, and they prefer places where there is no strong current. They are both rooted

in the mud of the bottom, and have thick, fleshy root-stocks. The large, leathery, heart-shaped leaves that lay flat on the surface, without getting wet on top, are much alike in the two species. But the flowers, even apart from their colour, are very different.

The yellow water lily never opens widely, but always remains ball-shaped; it is entirely yellow—sepals, petals, stamens, and pistil. There are five or six large sepals, enclosing about twenty small and narrow petals, which bear nectar-glands.

The white water lily is less frequent than the yellow, and is generally found on larger sheets of water. It has only four sepals, and these are coloured green on the outside and white on the inside. They spread widely when the flower is open, and the numerous petals in several rows so dispose themselves that the flower has a very full and attractive appearance. The petals that are next to the sepals are large, and each row gets smaller towards the centre, so that the only thing that marks them as distinct from the broad stamens is the presence of the anthers.

#### **The Arrowhead**

Among the plants whose roots are in the bed of the stream with leaves and flowers in the air is the arrowhead, whose leaves alone will enable us to recognise it, though we may never have seen it before. They are of regular arrow-head shape, and while some lie on the surface, others stand up. Those that are submerged are thin and almost transparent.

A tall, leafless flowering stem arises from the centre of the arrowhead leaves, and at regular intervals this sends off short branches in threes, each branch ending in a flower nearly an inch across. This consists of three green sepals and three white petals with a purplish base. The lower flowers have no stamens, and are smaller than those above, which have many purple stamens but no pistils.

The pistillate flowers develop into large round fruits. From the swollen base of the plant runners are sent in all directions, and at the ends of these, before winter, tubers will be formed, into which all the materials of leaf and stem will be withdrawn, and next year each tuber forms a separate plant.



THE WATER PLANTAIN

This plant is misnamed, for it is no relation of the true plantains, although its large and veined leaf is something like that of the greater plantain. The flowers are pink, and the plant is found in river, pond, and ditch.



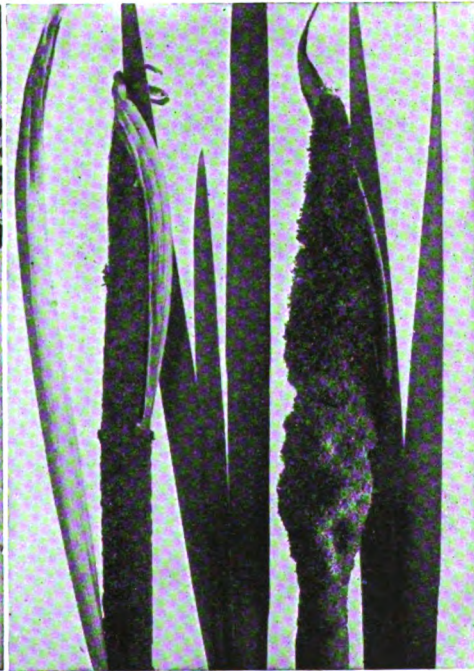
THE FLOWERING RUSH

The flowering rush, which is not really a rush at all, is a very attractive plant with its tall stem of rosy-pink flowers, growing out of reach of the banks of the European streams. Before blooming it is unattractive.



THE GIANT DOCK

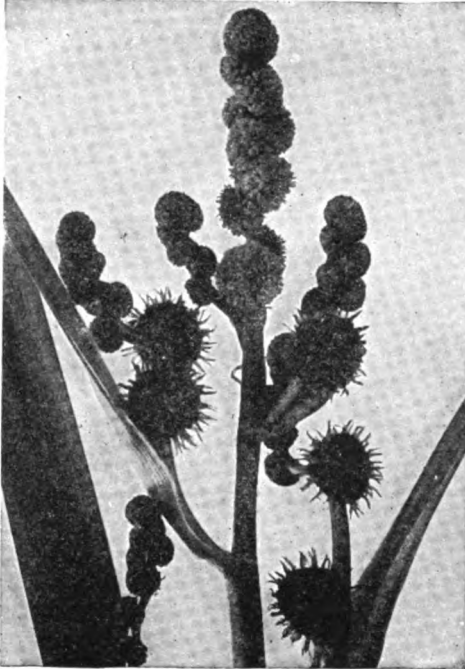
The giant dock, or great water dock, is a picturesque plant, very frequently found growing on our river-banks. The lance-shaped leaves are more than a foot long, but the green blossoms are not very pleasing to the eye.



THE REED-MACE

The reed-mace, or cat's-tail, is often called the bulrush, although the real bulrush is quite a different plant. But hawkers in our large towns sell the long spikes for ornaments, and they invariably call the plant the bulrush.





**THE BUR-REED**

The branched bur-reed is a large graceful plant, living in our ditches and ponds. The leaves are sword-shaped, and the flowers are of two kinds, some being small and olive-coloured, while the others are larger and green.



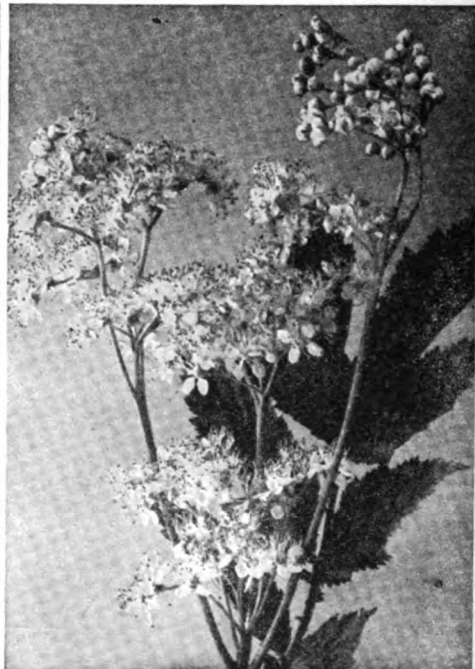
**THE SNAKE'S-HEAD**

This plant, which is also called the fritillary, gets the name snake's-head from the fancied resemblance of the unexpanded flower to a serpent's head. The purple flowers are not unlike tulips, but they droop from the stalks.



**THE PURPLE LOOSESTRIFE**

The purple loosestrife is a handsome plant, and its reddish-purple flowers, growing in tall spikes among the rushes of a ditch or stream, might be mistaken for foxgloves at a distance. The plant is often used as a tonic.



**THE MEADOW-SWEET**

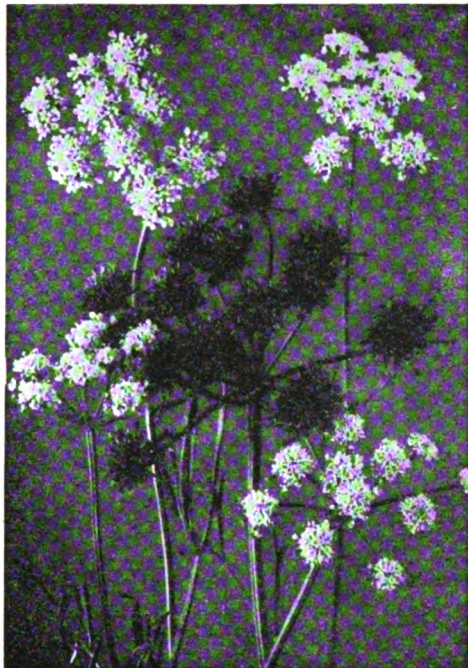
This familiar garden flower, with creamy-white, fragrant blossoms and handsome foliage, well merits its other name of queen of the meadows. It is mentioned in old flower books as a useful and reliable medicine.





THE WATER AVENS

This plant is somewhat handsome with its slightly drooping flowers, reddish-brown in colour. The stems and leaves are hairy. The name avens comes from a word meaning oat, and refers to the oat-like fruits of the plant.



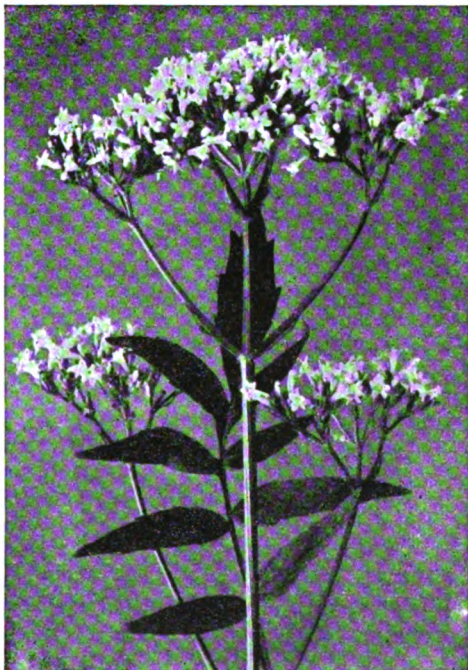
THE SULPHUR-WORT

The sulphur-wort, or pepper saxifrage, is not exactly a streamside plant, although it is often found growing in meadows by European streams. The flowers are a dull yellow, and the fruit, seen in the picture, is dark brown.



THE WATER DROPWORT

The water dropwort grows on the water, and the lower leaves are submerged, the stems and leaf-stalks being swollen and hollow. The plant is used as a medicine, but it is harmful if taken without proper knowledge.



THE GREAT VALERIAN

The root of this plant is very attractive to cats, and also to rats, owing to its smell, and rat-catchers use it to entice rats from their haunts. The pink or white flowers have a pretty effect in the swampy places where they grow.

### **The Water Plantain**

Similar in the shape of its flowers, though much smaller, is the water plantain. It is no relation of the plantain of the fields, but belongs to the arrowhead family. The flower-stem rises three or four feet above the water, is much branched, and bears a large number of flowers, similar to those of the arrowhead, but smaller, and of a pale rosy tint. Each flower is complete, with six stamens and twenty pistils.

### **The Flowering Rush**

Another member of the arrowhead family is called the flowering rush, though it is only rush-like so far as its leaves are concerned. These are three or four feet long, straight and slender, but they grow quite erectly. The flower-scape is as long or longer, and the flowers are clustered in an umbel at the top. Petals and sepals are alike of a fine deep rose colour, so that the flower appears to be six-petalled. There are six stamens and six pistils, all of a deep red hue. This is a handsome streamside plant of the Old World.

### **The Great Water Dock**

Where we discover the arrow-head, we may also come across a giant dock, with broad, erect leaves two or three feet long, and a great towering panicle of the quaint reddish-green flowers. This is the great water dock, a plant of striking aspect.

### **The Reed-Mace, or Cat's-Tail**

The leaves of the flowering rush may easily be mistaken for those of the reed-mace, or cat's-tail, which many people wrongly call bulrush—another plant altogether. If we trace the leaves of the reed-mace downwards, we find their lower parts wrapped round the flowering stem, which is not the case with the flowering rush; otherwise they are much alike in shape and size. The stem—an inch thick—rises to a height of six or seven feet, and the upper foot of it is the flower-spike, the greater portion densely crowded with hundreds of tiny dark brown flowers, whose sepals and petals are reduced to mere hairs. The mass of flowers has the appearance of a coat of velvet round the spike.

### **The Fritillary, or Snake's-Head**

That frequent, quaint flower of Europe, the checkered, purple fritillary, or snake's head, is found only in American

can gardens, although similar fritillaries occur in Western North America, and their tiny bulbs are greatly prized by the Indians thereabouts as a food. They belong to the lily family, but the flowers are shaped much like small tulips, drooping from the top of slender stems, from which small leaves spring.

There is no distinction in shape, size, or colour between the sepals and petals, alluded to as a six-parted perianth. There are six yellow stamens and the pistil ends in three stigmas.

### **The Loosetrife**

Returning to our stream, we shall perhaps find purple loosetrife, which is also found in Europe, along its bank. It grows to a height of three or four feet, with an angled stem, clothed in lance-shaped leaves, which are usually in pairs, and more or less erect. The upper part of the stem bears whorls of six-petalled flowers red-purple in colour. There are twelve stamens and a slender pistil; and in this plant we shall find differences in the length of the stamens, similar to those found in the primrose.

### **The Meadow-Sweet**

The most plentiful of the stream-side summer flowers in Europe is the meadow-sweet, a plant that, judging by the light, foam-like masses of small white flowers, we should not at first sight take to be one of the rose family. But if we look at the beautiful divided leaves, we shall remember that they are much like those of the agrimony and silverweed. The flowers, also, when regarded separately, will be seen to be not unlike those of blackthorn.

### **The Water Avens**

Another member of the rose family, though not so plentiful as several others, is the water avens, closely related to the common avens, or herb-bennet, of European roadsides. Its leaves are much like those of herb-bennet, which are really on a similar plan of structure to those of meadow-sweet, but with coarser lobes; but the flowers are larger—an inch and a half across—with purple sepals and yellow petals.

### **The Dropworts**

There are several of the umbel-bearers known, in Europe, as dropworts, including sulphur wort, with gray-green, pipe-like stems, and a leaf that is





**THE MARSH WOUNDWORT**

This plant, with its erect stem and flowers of a dull light red growing in a long spike, has a strong odour, though it is less powerful than that of its near relation the hedge woundwort. It is common in marshes and rivers.



**THE HEMP AGRIMONY**

The flowers of the hemp agrimony, which grow in clusters at the tops of the flowering branches, are much visited by butterflies. They are dull lilac in colour, and the plant has an attractive appearance when in bloom.



**THE WATERCRESS**

The common watercress belongs to the cabbage family. We all know it as used in salad, but its little white flowers are less known to townfolk. It was introduced to New Zealand, where it now chokes up the streams.



**THE YELLOW LOOSESTRIFE**

Although the names are similar, this plant is not in any way related to the purple loosestrife, which we see on page 4964. This belongs to the primrose family, and the fine yellow flowers are very conspicuous indeed.



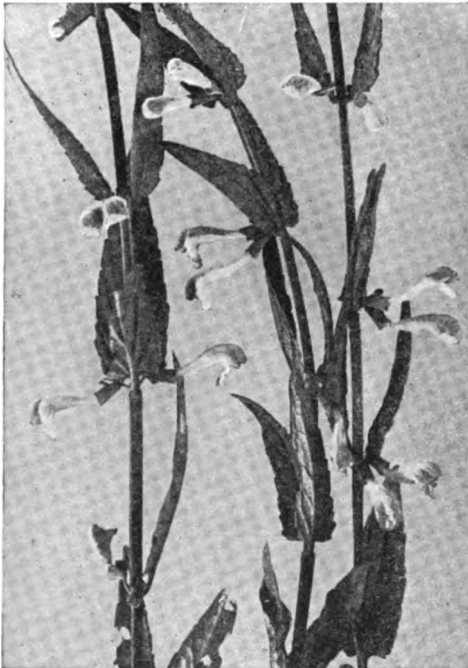
THE WATER FIGWORT

European anglers know the water figwort only too well, for their lines get entangled in the seed-vessels of the plant as it grows by the streamside or river-bank. The round flowers are a purplish chocolate in colour.



THE BROOKLIME

This is another member of the figwort family, and is often found growing with the watercress and water parsnip. It was formerly used as a remedy for the gout. The brilliant blue flowers are very handsome indeed.



THE GREATER SKULL-CAP

The skull-cap, with its bell-shaped flowers of bright blue, growing by the side of the river or in some marshy spot, is always attractive. The leaves are lance-shaped with a toothed edge, and the plant often grows to 18 inches.



THE MARSH CAREX

This is one of the family of sedges, which have grass-like leaves and are found growing in various situations, some in rivers and marshes, others in bogs, and others by the seashore. Most of them need damp situations.





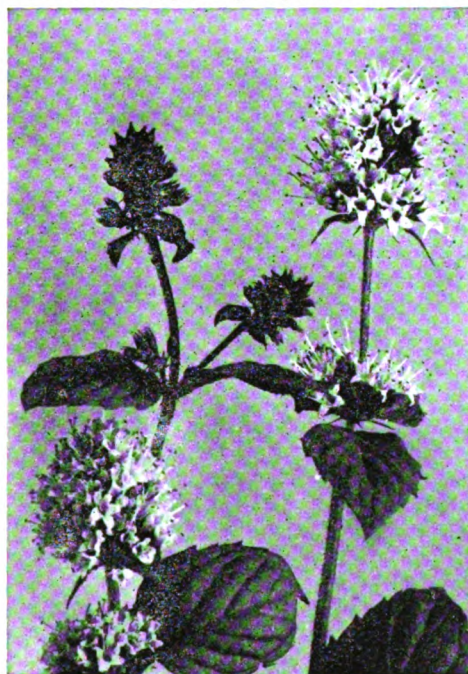
**THE GIPSYWORT**

The flowers of the gipsywort, which are white, dotted with red, are not very attractive. It is the leaves, the most conspicuous part of the plant, that first draw our attention to it as it grows by the pond, stream, or ditch.



**THE WATER VIOLET**

The large handsome lilac flowers of the water violet, each with a yellow centre, are among the most attractive of the Old World blossoms; they grow in a kind of pyramid on the flower-stalk, well out of the water.



**THE WATER MINT**

We all know the light lilac flowers of the water mint, found growing everywhere in wet ditches. It lends quite a bright touch of colour to the places where it grows in late autumn, when there are few other flowers in bloom.



**THE WINTER-GREEN**

The winter-green belongs to the heath family, and its scientific name is *pyrola*, which comes from a Latin word meaning a little pear. This name was given because the leaves resemble those of a pear-tree.

little more than a long pipe-like midrib with a few narrow leaflets on each side. A much larger species is the hemlock water dropwort, which has broader leaves of a more parsley-like form, and the small umbels of flowers more widely spread, because their foot-stalks are longer. This is a very poisonous and dangerous plant.

This hemlock-leaved water dropwort must not be confused with the water hemlock, or cowbane, one of the same family, with a similar reputation for poisonous properties. It has a stout root-stock, a tall, furrowed stem, and large wedge-shaped leaves that are much divided. Although the white flowers are very small, they are massed in large umbels, and the plant, as a whole, is attractive and imposing.

#### **The Hemp Agrimony**

An European plant that may appear to have some relationship to these umbel-bearers is the hemp agrimony, but it is really a composite. Its flower-heads contain only five or six pale purple tubular florets, instead of the two or three hundred to be found in a head of daisy or dandelion, and these heads form small clusters, which are in turn massed into great clusters at the top of the four-foot stems. The leaves consist of three or five lance-shaped, drooping leaflets, which are somewhat like the leaves of hemp, while the complete leaf has a resemblance to an elder leaf. It is a close relative of the American boneset and Joe-Pye weed.

#### **The Watercress**

Here and there we come upon a stretch of streamside where, for some reason, no tall plants grow; and here we shall probably find the watercress, which most of us can recognise by its dark, brownish leaves, which are broken up into roundish leaflets, arranged in pairs along the midrib, and the small white flowers are clustered. A glance at the four petals and the seed-vessels will show us that this is a cross-bearer.

#### **The Forget-Me-Not**

With the watercress will probably be the forget-me-not, with its strangely curled spray of sky-blue flowers, each with a little yellow round the mouth of the flower-tube. It belongs to the same

family as the beautiful viper's bugloss. Another relation is the comfrey, with three-foot stems, broad, lance-shaped, bristly leaves, and large tubular flowers of yellow or purplish colour, which hang with their mouths downwards.

#### **The Yellow Loosestrife**

There are so many flowers along the streamside that it is impossible to mention them all. There is the tall-growing yellow loosestrife, no relation to the purple loosestrife, but a member of the primrose family. It has a stem four feet in height, with broad, lance-shaped leaves and pyramids of bright yellow, bell-shaped flowers, though they do not hang as bells do.

#### **The Great Valerian**

Another tall plant is the great, or cat's, valerian, sometimes found in gardens, whose root-leaves are divided into pairs of lance-shaped leaflets, and whose small pale-pink flowers are clustered. This is the plant whose root-stock cats are so fond of that they tear it up if planted in the garden.

Rats are very fond of the odour of this plant, too, and it is said that rat-catchers often employ the root-stock to entice the rats from their hiding-places, in order to ensnare them.

#### **The Figwort**

Then there is the figwort of Europe, with thick, square stems six feet high, large oblong leaves, and green and brown flowers shaped like a coal-scuttle, because that shape best suits the heads of wasps, who have a liking for its colour and unpleasant smell.

#### **Other Flowers of the Stream**

The labiate, or mint, family is represented along the streamside by several kinds of mint, which remind us of their presence by their strong, sweet odour; and by gipsywort, skull-cap, and marsh woundwort. Gipsywort has oblong leaves in pairs on its square stem, and whorls of tiny bluish-white flowers dotted with purple. Skull-cap, with a similar arrangement of stem and leaves, has its large blue flowers in one-sided pairs. Marsh woundwort is a plant much like hedge woundwort, but shorter, with narrower leaves and paler flowers.

The next story of Plant Life is on page 503.





The famous King of Assyria, Ashur-bani-pal, hunting wild beasts in the company of his attendants.

## BABYLONIA AND ASSYRIA

### LIFE IN THE WORLD 7,000 YEARS AGO

THE story of Babylonia and Assyria presents us with a view over the mists of Time just as vast and just as marvellous as that presented by Egypt. To get a clear idea of the relative positions of these two oldest countries in the world, and also of the points in which they are so much alike, let us imagine ourselves sailing over the mid-world desert in an airship from the Sahara to Persia.

There lies Egypt, a narrow valley in the great desert. Then, as our airship sweeps eastwards, we see below us, between the Mediterranean and the long, narrow Red Sea, shimmering in the hot sun, the Isthmus of Suez. Beyond this great "highway of nations" we cross over the wedge of desert which pushes up from the north of Arabia to the highlands of Syria.

Then we find ourselves looking down on another valley, also carved out of the desert. It is wider than that of the Nile, for here are two rivers, the Euphrates and the Tigris, rising in the hills of the west and north, and flowing south-east, more or less side by side, till they meet in one stream, which passes into the Persian Gulf. One of the old names

CONTINUED FROM 4792



for the land between and about these two rivers is Mesopotamia. Beyond the mountains that edge the Tigris basin we look down again from our height on the desert reappearing in the plateau of Persia.

That there had been a great past in the land between the rivers was known through all time, not from gigantic monuments still standing, as in Egypt, but partly from the echoes of old stories and legends handed down from generation to generation, partly from accounts of kings of the country who were closely connected with the history of the Jewish nation, and partly from the writings of old authors, such as Herodotus, who visited the country in the course of the centuries.

But the sad face of the country itself was silent and expressionless as to the details of that past. At least, so it seemed till about a hundred years ago, when first one traveller and then another began to wonder at the great mounds which are dotted all over the flat country.

Sometimes Arab villages are built on these mounds, and crops are cultivated on their sides; in spring they are gay with wild flowers. There are most interesting models of

some of the mounds in the Louvre Museum in Paris, and both the French and English nations were at last roused to send explorers to dig down into them to find out what secrets they held. Little pieces of carved marble had been washed out by the heavy rains, and had given an idea of what might be below.

#### THE LOST EMPIRES THAT LAY BURIED UNDER THE DUST OF AGES

Just then the world was waking up to feel real interest in finding out the truth about the past, by collecting and studying the treasures that Mother Earth had kept so long in safety.

In course of time, with infinite labour and difficulty, delays and dangers, the explorers, French and English, succeeded in showing that in the mounds, hidden under the dust of ages, lay the remains of the life of the great past in the valley of the two rivers, whose records it had been long thought were entirely lost.

As more mounds and sites are dug over, not only in Mesopotamia, but in the surrounding countries, the study of the remains found in them unfolds the long, absorbing story, chapter by chapter. And the surpassing wonder of it is that these records had been buried, out of sight and out of memory, for more than 2,000 years.

Now, the remains of the mounds are very different from those of the tombs of Egypt. To begin with, there are no mummies, no personal possessions like those that brought us into such close touch with the old Egyptians, no vivid coloured paintings, no illustrated papyri. At first sight, when walking about the Babylonian and Assyrian galleries in the British Museum, the man-headed monsters of grey stone, the slabs carved with rather confused-looking reliefs, the clay cylinders and little tablets like cakes of soap, covered with writing, the small roller seals, may almost look uninteresting and dull when contrasted with the dolls and toys, furniture and shoes, of the fine Egyptian galleries.

#### THE LITTLE GREY CYLINDERS THAT UNVEIL A WORLD OF WONDER

But as we look into them the apparent dullness vanishes as by magic, for by their means we are carried right into the gorgeous palaces of the kings of Assyria, whose names and doings are so familiar to us in Bible story; and centuries farther back still, we

are led into the busy country life of old Babylonia, when the rivers, kept in by embankments and connected by canals, were covered with boats and barges, carrying the produce of well-watered and fertile fields. We can almost smell the sweet hay, and see the chaff flying, and hear the cattle lowing, and enter into the bustle of sending these things to market—all more than 4,000 years ago.

By their means, too, we are able to enjoy first hand particulars of the gorgeous temples of the Sun and Moon gods, from whose worship Abraham fled, to found a nation that was to own only the one unseen God.

For a key to the writing that covers so many of the remains of the mounds was found in due course. At first people were almost more hopelessly in the dark about the meaning of the endless combinations of arrow-headed signs than they were about the Egyptian writing, and there was no stone found like the Rosetta stone—about which we have been reading on page 4782—that could be studied, with a known language like Greek upon it, as a basis for translation.

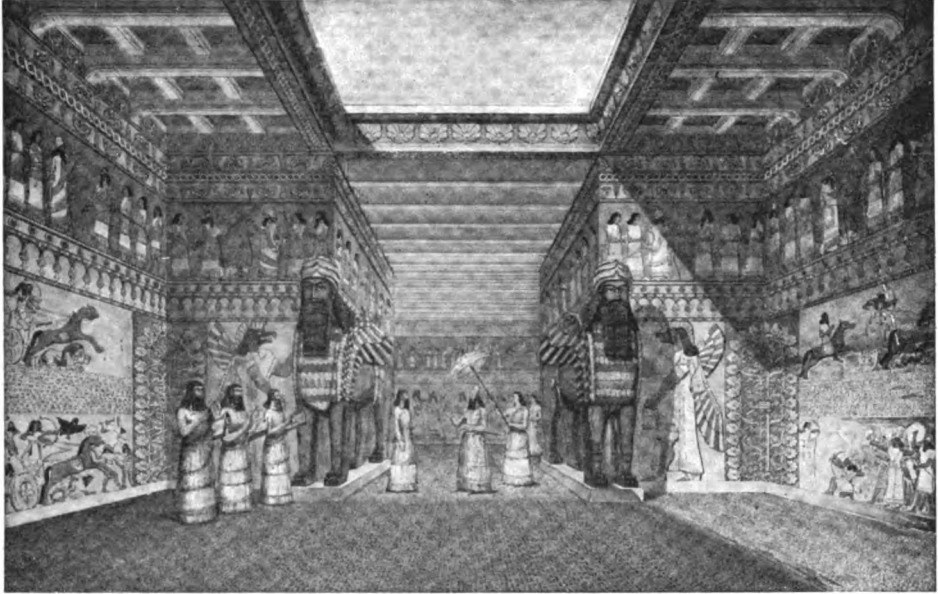
#### A MAN WHO SWUNG OVER A ROCK TO GET THE KEY OF THE PAST

But a dauntless traveller in the neighbouring country of Persia saw on the face of a high rock an inscription in three languages. His ladders were too short to reach it from below, so he had himself slung down from above, and obtained, with the greatest difficulty, the squeezes—copies made with damp paper which look like the raised letters for the blind—of the writing on this rock at Behistun.

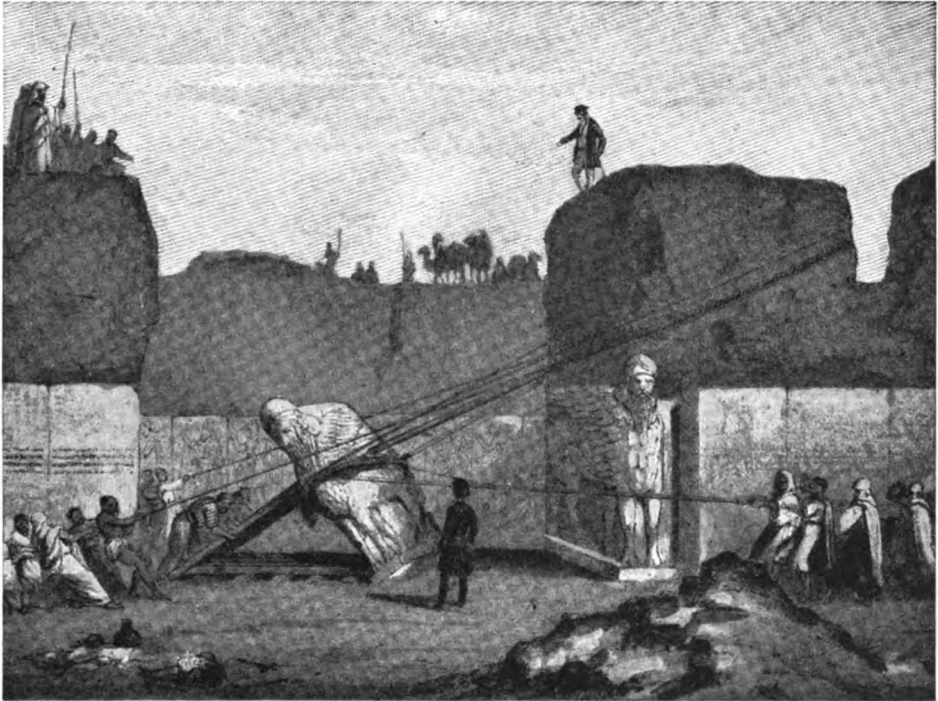
Scholars spent many years in patient labour, comparing these inscriptions with others that were found from time to time. Gradually, by studying a known language that was derived from the same stock as one of the three on the rock, they came nearer and nearer to solving the problem, till at last success crowned their efforts. They had the joy of being able to receive the message of the long-buried past, which, as one of the old kings said, had been written on the stones and clay, for all nations and for all time.

On the stone monsters, and on the slabs and monuments and walls of the temples, the wedge-shaped signs, or *cuneiform* characters, as they are called, were chiselled out with tools; on the

## A PALACE OF ASSYRIA IN GLORY & IN RUIN



This picture shows what an Assyrian palace must have been like in the days of Nineveh's glory and greatness. The massive walls are covered with realistic hunting and battle scenes, beautifully coloured, while towering high above the king and his courtiers are the great winged creatures, of which we may see examples in the Metropolitan Museum. In such beautiful palaces lived the cruellest kings of whom history makes any mention.



Sir Henry Layard was one of the earliest pioneers of Assyrian research. Digging beneath a great mound at Nimroud, near the River Tigris, which he supposed to be the site of an ancient city, he discovered the remains of a palace, and among other relics that he sent home to the British Museum was a huge winged bull with a human face. Great difficulty was experienced in lowering this for conveyance to the river, and when it was getting near the ground all the supporting ropes suddenly broke together. The bull fell, but was not injured.

clay cylinders and tablets they were impressed, while the clay was still moist, by a stylus with a specially shaped point. Afterwards the cylinders and tablets were dried in the sun or an oven.

**THE BOOKS OF STONE AND CLAY THAT NOTHING COULD DESTROY**

These cylinders and tablets are the books and letters of the country, and in spite of the destruction by fire of the buildings in which they were preserved, in spite of occasional damp to which they have been subjected during their long burial, these old books and letters have remained indestructible.

Now, the story of Mesopotamia has not been like that of Egypt—one more or less unbroken whole, through several thousand years. The language, writing, and religion of the country have not remained the same, nor has it been all the time under more or less the same form of government.

As we pass along the centuries in the valley of the Euphrates and Tigris, we shall hear of an entire change of race in early years, of a mighty division in the country later on, of incessant and terrible wars, not only between the rival kingdoms of Babylonia and Assyria, but with all the nations round. Among these were, on the west, the Hittites, the Syrians, the Canaanites—part of whose land was taken by the Hebrews when they came out of Egypt; and on the east, the Elamites, the Cassites, and the Medes and Persians.

In Mesopotamia, the earliest people that come into history were of the same Mongolian stock as the Chinese and Finns, and they pushed out a still earlier people, of whom little is known. When Menes was building his capital, Memphis, and turning the course of the Nile to make more room for it, as we read on page 4785, there were already many large cities, each with its powerful ruler, near the mouth of the Euphrates—quite a different mouth from that which exists to-day.

**THE RIVER THAT HAS DRIVEN THE SEA FARTHER AND FARTHER BACK**

There is no strong current in the Persian Gulf, as in the Mediterranean, to wash away the sediment of sand and mud brought down by the rivers which once had separate mouths. So all through the years—and it is still going on—new seashore has been formed of that sediment, ever pushing back the

waters of the gulf. Scholars have calculated how long the miles of new seashore have taken to form, and by that means they guess at the age of the old cities which were seaports when first built, but whose sites are now far inland.

This lower part of Mesopotamia, the gift of the two rivers, is often called Chaldæa, especially in the Bible, and very old names for it also are the Land of Shumer, or Sumer, and Akkad.

The Sumerians and Akkadians, the Mongol peoples who are believed to have come down from the heights that surround the wide plain, made of it a very fertile land, with good tillage and drainage and watering, so that they could grow corn and dates and figs, and could keep much cattle in the rich pastures. These ancient people were great temple-builders too, as is shown by the bricks and gate-sockets, stone slabs, and other remains found in the old cities of Ur, Shirpurla, Erech, and others.

**THE OLD DICTIONARIES THAT WE CAN SEE IN THE BRITISH MUSEUM TO-DAY**

As long ago as 4,000 years before Christ, their language was quite formed and full, and was expressed in a picture-writing, modified as the years went on, somewhat like that of the old Egyptians.

These Sumerians—all shaven and shorn in the portraits that have come down to us—loved learning of all kinds as much as they loved agriculture and building, and when, about 3,800 years before Christ, they were conquered by a race of quite different stock, with beards and flowing hair, who had long lived to the north and west of them, they were not driven out. They taught these Semitic invaders much of their civilisation, and gradually, through many centuries, the races fused together, and the country became known as Babylonia, from its capital, Babylon, on the banks of the River Euphrates.

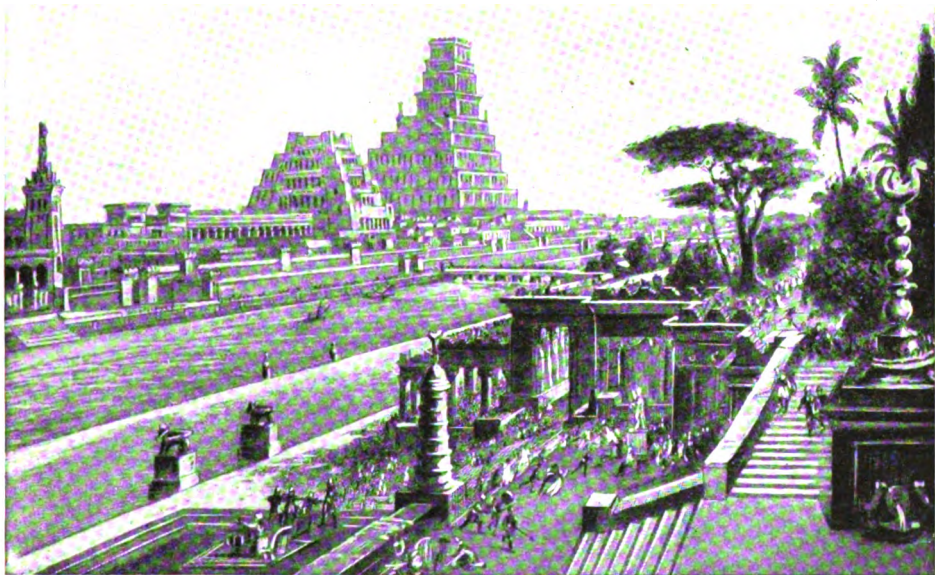
The old language, in which were written accounts of the religion and laws, lasted for a long time, and was learnt by the invaders as they settled down, by means of grammars and dictionaries and translations which we can see in the cases of the British Museum to-day. Just as the Roman alphabet is used nearly all over Europe in which to write various languages, so the old Sumerian picture-writing, which gradually developed into wedge, or arrow-headed, signs, was used not only by the Babylonians and



# THE PALACES OF ASSYRIA AND BABYLON



The rulers of Assyria built for themselves many great and magnificent palaces and temples. One of their most wonderful palace-cities was Calah, about twenty miles from Nineveh, and from this picture we get some idea of the splendour of the city in the height of its prosperity when it was the capital of the empire under King Ashurnasir-pal. It was in a palace at Calah, now called Nimroud, that the great bull shown on page 4973 was found.



Babylon, under its later kings, was, like the cities of Assyria, a place of glory and beauty. Neither money nor labour was spared in making it the most magnificent city the world had ever seen. But while it was given up to luxury and revelry, the Persians turned the River Euphrates from its course, and, marching along the dry bed of the river, captured the city without a battle. The tower in the middle of the picture is the temple of Bel.



Assyrians themselves, but by many of the nations around. A grand name stands out among the rulers of the newer race, that of Hammurabi, King of Babylon about 2,100 years before Christ, a few centuries later than the time when Abraham and his family are believed to have made their hasty departure from Ur of the Chaldees, to wander with their flocks and herds in the lands on the other side of the desert.

**THE JUST LAWS THAT GOVERNED MEN  
FOUR THOUSAND YEARS AGO**

One of Hammurabi's many claims to greatness is that he was a fine law-giver. Some say that his code of laws is the oldest in the world. We can see a cast of the pillar on which he inscribed them in the British Museum. His portrait, with a long beard, is at the top, and shows him in the act of receiving the laws from the Sun God. He set up many copies of the pillar, so that his subjects in different parts of his dominions could find out their just rights before going to law.

Some tablets, round in shape, deal with the measurements of fields and estates, and bring a picture before our eyes of the carefully tilled land. Boundaries were often difficult to keep in such a flat country where floods frequently happened, in spite of all the work done on the embankments; hence the number of boundary stones that have been found of all dates, inscribed with pictures and writing.

Other tablets of a square shape relate to the wages of the workers in the fields, children as well as men and women, and to the levying of taxes and all sorts of business to do with loans and repayments, and the buying and selling of houses, fields, slaves, and many kinds of goods.

**THE GREAT PLATFORMS ON WHICH THE  
TEMPLES OF BABYLON WERE BUILT**

The great industry of the country, besides agriculture, was brickmaking, for stone was very scarce, and clay was abundant. Enormous numbers of bricks were needed, for it was customary to set up the great buildings, temples, and palaces, on huge platforms made of sun-dried bricks, to raise them out of the way of the floods. Harder bricks were used for facing and ornamental purposes, many of which bear the names of kings and accounts of the buildings

they set up. It was the custom, too, to build high and broad walls of brick round the large cities. All the time that building, agriculture, and trade were thus flourishing in Babylonia, the people were becoming more and more numerous, and at last they began to go out as colonists northward, in the higher valley of the two rivers, where the country rises towards the hills beyond, and the climate is more bracing.

They built large cities, Nineveh, on the Tigris, being the chief, on much the same plan as of old. They were erected on raised platforms, though natural hills were to hand, and they used the same sort of bricks, though quarries of building stone were easy to get at.

Presently the colonists became strong enough to break off from Babylonia, and their country, under a king of their own, became known as Assyria, which means the land of the god Ashur. This was about the eighteenth century before Christ.

**THE FINDING OF THE TABLETS THAT  
TELL THE STORY OF THE PAST**

The Assyrian character, influenced no doubt by the more invigorating air of the northern country, became more bold and warlike as time went on. Less interest was taken in the peaceful pursuits of trade and farming, and a great passion for war and conquest took its place, partly, perhaps, forced on them by the constant attacks of the powerful nations that lived round about.

As far back as the time of Hammurabi there had been fierce struggles with the Elamites and their northern neighbours, the Cassites, whose power lasted in Babylonia some time after the great division of the two kingdoms. We read on page 4786 how the kings of Egypt gradually extended their power across the Isthmus of Suez and over the states that lay between them and the great kingdoms in the valley of the Euphrates and Tigris. Amenophis III. made these states pay tribute, and he took great delight in hunting lions in these countries.

He married a lady of Western Asia, who influenced her son so much towards the religion of her country that he gave up the old Egyptian religion and set up a temple in a new city on the Nile, in which to honour the splendour of the sun's rays. In the ruins of this city were found the famous Tel-el-Amarna tablets,

inscribed in the arrow-head, or cuneiform, writing. They opened up a whole chapter glowing with life of most interesting history, hitherto quite unknown, of the relations between the kings of Egypt and the kings of Western Asia in the fifteenth century before Christ. There is a table-case full of them in the British Museum, with translations beside them. Egyptian governors of provinces in Asia beg for help against rebellious subjects and for supplies of food. Proposals of marriage for princesses of the royal houses are made with due ceremony, and much discussion follows as to dowries and presents, such as chariots and horses, gold and ivory.

Incessant war seems to have gone on in the fourteenth century before Christ between Babylonia and Assyria, in which the Cassites were much mixed up, and a century later Assyria conquered the old mother-country of Babylonia under a king named Tukulti-Adar I. With few intervals, for some centuries Assyria held the proud position of leading power of Western Asia.

#### **KING DAVID'S FRIEND, THE WARRIOR KING OF ASSYRIA**

One of the most interesting of the early Assyrian kings is Tiglath Pileser I., believed to have been the friend of King David; he lived towards the end of the twelfth century before Christ. There are delightful accounts in his cylinder inscriptions of the expeditions of the doughty old warrior, especially of the one he made when he "mounted" a ship, evidently for the first time, for a trip on the Mediterranean, in company with his friends, the sea-faring Phœnicians.

The kings who reigned during the two and a half centuries which covered the time of Assyria's greatest glory and power were notable men, and it is their palaces and temples that have been dug out of the mounds of Nineveh and its neighbourhood by Monsieur Botta, Sir Henry Layard, and other great explorers. It was to these palaces that the kings returned in pomp and triumph after vanquishing and sending into exile many of the neighbouring nations, including the people of Israel.

It cost great labour and anxiety to bring from the banks of the Tigris to those of the Thames the huge man-headed bulls of ancient Assyria.

They are wonderful both in form and in size. The rows of curls in the hair and beard are in the typical Assyrian fashion. The great wings are finely carved, and there are five legs to each. These monsters, with the strength of a bull, the swiftness of an eagle, and the intelligence of a man, were set at the entrance of the grand palaces so that they should look well both from the front and the side.

#### **THE GREAT WINGED MONSTERS GUARDING THE FOOTSTEPS OF THE KING**

"Guardians of the footsteps of the king" these monsters were called, and imposing they must have looked when set up in their original places, in the wide courts lined with the pictured stone slabs, glowing at that time, it is believed, with brilliant colours. It is those slabs—enough have been brought over land, river, and sea to line the walls of several galleries at the British Museum—that tell us all about the footsteps of some of the best known of the kings of Assyria in the time of its greatest glory, from the ninth to the seventh century before Christ.

They were all great warriors, great builders, and great hunters—and three of them, at least, were great collectors of books.

From the grave-mound of the ancient city of Calah were dug out the remains of the palace of Ashur-nazir-pal, a long name that means "Ashur protects his son." Very lifelike are the portraits in relief on the slabs, showing Ashur-nazir-pal conquering his enemies, on the march and crossing rivers. Particularly interesting are the pictures of soldiers swimming on skins blown out like air-balls, also those of the horses swimming quietly behind the barge carrying the king's chariot. Very imposing does the king himself look as he pours out offerings to the gods over the dead bulls and lions he has killed.

#### **A BLACK STONE THAT TELLS THE HISTORY OF A FAMOUS KING**

The son of Ashur-nazir-pal, Shalmaneser II., also built a palace at Calah, and on a famous black obelisk of his we have the account of the expeditions he made during his long reign. The sculpture is in bands, and shows processions of the conquered peoples bringing tribute of dromedaries, elephants, apes, and horses. The second band is very interesting to us, for it records

the tribute of Jehu, King of Israel, consisting of all kinds of vessels of gold. Tiglath Pileser III., called by his Babylonian name of Pul in the Bible, lived about a hundred years after Shalmaneser II. His inscriptions and pictured slabs show him to have been very warlike. We see him assaulting a city, the gods being borne off in procession; in another place he is standing with his foot on the neck of a foe.

In still another picture we may see flocks and herds being driven away, and women and children being taken off in a cart. It was Ahaz, King of Judah, who asked Tiglath Pileser III. to help him against his enemies, with the result that the terrible doom of being carried into captivity fell first upon the Israelite tribes across the Jordan.

**CARRYING THE CONQUERED PEOPLE INTO DISTANT LANDS**

This plan of carrying away conquered peoples far from their homes, and replacing them with others from some other distant part of the empire, caused bitter suffering through the years of Assyria's greatness, as the wailing dirges of the Jews, which we still sing and read in our services, remind us: "By the rivers of Babylon, there we sat down, yea, we wept, when we remembered Zion."

When Sargon became King of Assyria he took Samaria after a long siege, and sent its inhabitants far away from their homes to settle beyond the Euphrates. From his splendid palace near Nineveh came the fine man-headed bulls, and the cuneiform writing upon them tells of his expeditions; so does that on his cylinders found among other historical records.

The cylinders of Sargon's famous son, Sennacherib—so well known to us in Bible story—may well be full of most interesting details, for he fought many campaigns, and built and restored many palaces. The slabs from one of these, now in the British Museum, are of absorbing interest, for they show in graphic manner how the great palaces in Assyria were set up. We can distinguish the files of men making the platform mound on which the buildings were raised. They mount with loads of stones, bricks, and earth, hurl them down, and then descend to refill their empty baskets and hasten

up again. Great crowds of workers there are in every direction—surely slaves and prisoners, for all are kept in order by overseers and taskmasters with threatening sticks in their hands.

**THE BUSY SCENE WHEN THE WINGED MONSTERS WERE MOVED ABOUT**

Numbers of them are straining at long ropes, hauling a sledge running on rollers, eased by wedges of stones and a powerful lever worked by pulleys. On the sledge is one of the monsters to be set up as "guardian of the king's footsteps." His curls and sash are not in place yet, for he is still in the rough, fresh from the quarry from whence he has come by boat.

We can see the boats or rafts made of trunks of trees lashed together on the river shown close by, with the eels wriggling about, and the little pigs with their mother among the reeds.

But we must turn again to the workmen, hastening hither and thither with all sorts of tools and building materials, and from them to the impassive soldiers keeping guard over the person of Sennacherib himself, gorgeous in patterned cap and fine tunic, standing in his splendid car, with a fine umbrella over his head, and fly-flaps waved by attendants. It makes us think of the Pharaohs watching the rising of the Pyramids.

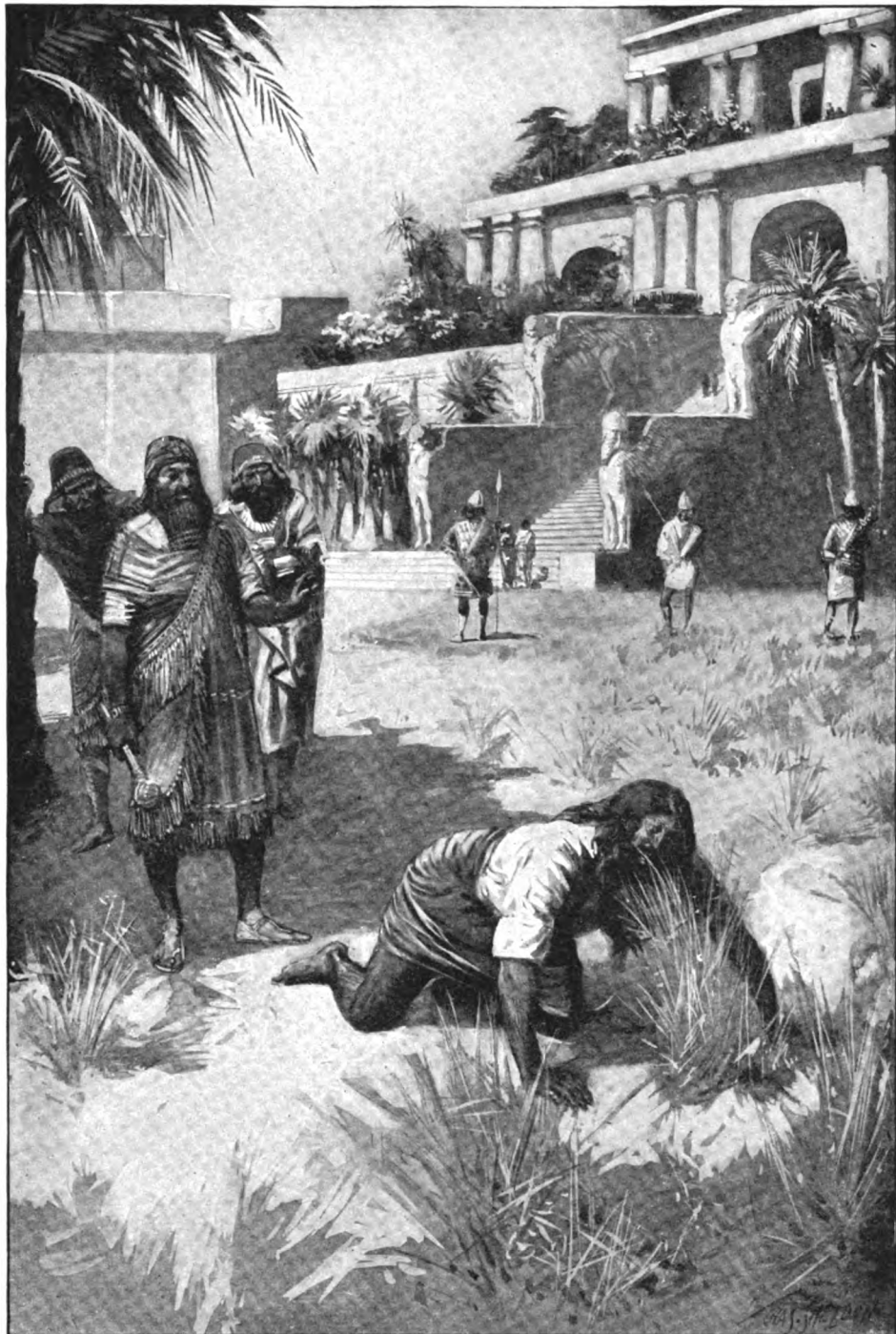
What heat and dust and noise the whole scene suggests! Over the king's head runs the inscription: "Sennacherib, king of multitudes, king of Assyria, had the bulls and colossi set up with joy. They were made in the land of the Baladon—near the source of the Tigris—for the palace of his lordship, which is within Nineveh."

**THE GREAT CART THAT THREE HUNDRED MEN COULD NOT PULL**

More than three hundred men were needed to pull the cart on which one of the Assyrian bulls was placed, some twenty-six centuries later, when Sir Henry Layard had it dug out of the mound, and astonished the natives by sending it home to England.

There is a picture on another slab of Sennacherib sitting on an armchair sort of throne, receiving from his chief officers the report of the taking of the city of Lachish. Flushed with his success, Sennacherib sent a threatening

## THE MADNESS OF KING NEBUCHADNEZZAR



Although by his ability and his military prowess Nebuchadnezzar restored Babylonia to the position of first empire in the world, his mind gave way, and for a time he became as a beast of the field. Fancying himself to be an animal, he spent his days in the grounds of his palace and tried to feed upon grass. The prophet Daniel, who tells us of this madness, says: "He was driven from men, and did eat grass as oxen, and his body was wet with the dew of heaven, till his hairs were grown like eagles' feathers and his nails like birds' claws."

message to Hezekiah, King of Judah, who had dared to withhold the tribute he had agreed to pay. As the King of Egypt had encouraged Hezekiah to take this bold course, Sennacherib was furious with him too, and hastened down to the borders of Egypt to settle with him first. But the battle was never fought. By a plague or some other great disaster the flower of the army perished in one night, and Judah, as well as Egypt, for the time escaped.

Under Esarhaddon, the son of Sennacherib, and his famous son Ashur-bani-pal—a name that means "Ashur creates a son"—the two great nations of Egypt and Assyria came to very close quarters, for the Delta was conquered by the Assyrians, and the terrors of war were carried far up the fertile Nile valley. There is a piteous picture of the destruction of the crops, and the misery of the people, and the plundering of cities and temples among the annals of the conquerors. Ashur-bani-pal was the strongest of all these strong kings, and many stories of his riches and greatness lingered through the centuries, much mixed up, as we know now, with legend and fable.

#### THE POWER AND POMP OF THE CONQUERING KING OF MULTITUDES

It is amazing to think of the power in the hands of this one man, as he stands there in his gorgeous clothing, his dazzling ornaments and embroideries and rosettes. King of multitudes—not only over his own people and race in the valley of the two rivers, in their immense cities and fertile fields, but also of the nations round, reaching from the Sea of the Rising to the Sea of the Setting Sun—from the Persian Gulf to the Mediterranean.

He lived through many years of campaigns, in which were conquests, as shown on the pictured slabs, full of cruelties one cannot bear to look at. The campaigns against the Elamites are among the most vivid of the battle-pieces, when Te-umman, the king who had dared to rebel, was slain with his sons, and the mass of the army perished by the sword, by torture, and by drowning.

Among the proud accounts Ashur-bani-pal gives of the successes against the Elamites there is the statement, "With the cut-off head of Te-umman, the road to Arbela I took with joy."

On the only slab among the Assyrian sculptures which gives a picture of quiet home life, Ashur-bani-pal and his queen are shown feasting in a garden, and the cut-off head of Te-umman hangs on a tree just above them.

Ashur-bani-pal passed much of his time, when he was not killing men, in killing animals, and the slabs from his palaces that show him hunting lions, wild asses, and goats are in the finest and freest style of Assyrian art.

Pain, terror, fury, are all shown in lifelike reality, evidently studied from nature, as the king's arrows and spears carry death in the hunting-grounds.

#### ONE OF THE MOST WONDERFUL LIBRARIES THAT THE WORLD HAS EVER SEEN

But Ashur-bani-pal not only carried on the traditions of his family in warlike prowess and in successful daring in the hunting-field; he was a great book collector, like his grandfather, Sennacherib, and his great-grandfather, Sargon. Like them, too, he sought for copies of the old Babylonian books in the libraries and temples of the ancient cities, and set scribes to work copying, repairing, translating, arranging, and cataloguing, as well as writing new annals, till the library in his palace became one of the most wonderful the world has ever seen.

There are some thousands of these books in the British Museum alone, and many have labels beside them giving an account of their contents. So let us now spend a little while in that most delightful of all occupations, wandering round a library, dipping into new books—new to us, though the hands that wrote them, and the eyes that first read them, have been turned to dust for long centuries.

#### HOW THE KING OF HOSTS WROTE HIS NAME IN HIS BOOKS

Ashur-bani-pal wrote his name and address in his books in rather a lengthy and vainglorious form, but it is very interesting. "The palace of Ashur-bani-pal, king of hosts, king of Assyria, who putteth his trust in the gods Ashur and Bélit, and who has eyes which see, and ears which hear. I have written upon tablets the noble products of the work of the scribe, which none of the kings who had gone before me had learned. I have arranged them in classes, I have revised them and placed them in my palace that I, even I, the ruler who



knoweth the light of Ashur, the king of the gods, may read them. Whosoever shall carry off this tablet, or write his name upon it side by side with mine own, may Ashur and Bélit overthrow him in wrath and anger, and may they destroy his name and posterity in the land."

It is the creation tablets in this royal library of Nineveh that arouse the greatest interest. It is believed that they are copies of much more ancient ones from the kingdom of Babylonia.

"Thy heart shall be pure before thy god, for that is due to him. Thou shalt pray, and shalt make supplications and bow low to the earth early in the morning."

Of surpassing interest, too, are the tablets bearing what has been called the oldest fairy story in the world, the wanderings and adventures of the great hero Gilgamesh. We catch bewildering glimpses of prowess like that of Hercules, the hero of the Mediterranean, of



THREE KINGS OF ASSYRIA, CARVED IN STONE THOUSANDS OF YEARS AGO  
On the left is Esarhaddon, the son of the Sennacherib mentioned in the Bible; in the middle is Ashur-bani-pal, his son, perhaps the most powerful and cruel of all the Assyrian monarchs; and on the right is Ashur-nazir-pal, who lived about the time of Jeroboam, King of Israel. He was a great conqueror, a great boaster, and a great builder.

The familiar visions of the opening chapters of the book of Genesis rise before us as we read in these other old books of beginnings of the time when the heavens were not and the earth was not.

Familiar, too, do the words seem which describe the creation of the planets and stars, and of the moon to determine the days, followed by the account of the filling of the earth with beasts and cattle, and birds and creeping things. How well known to us seems the teaching of the god Marduk to the man who is the crowning work of his marvellous creation.

dazzling experiences like those of Sindbad the Sailor, for Gilgamesh fought unequal battles with monsters, and was helped by a sailor, and saw trees laden with precious stones instead of fruit.

In the course of his wanderings he heard the story of the Flood from the Babylonian Noah, and how he built a ship and saved himself and his family and some animals, and how all the rest of living creatures were drowned in the storm of rain and wind. He heard, too, of the flight of the dove from the ark, followed by a swallow and a raven, and the reappearance of dry

land and the repeopling of the earth. But we must pass on to the grammar books, and those giving lists of signs and their meanings; more than 300 signs are in common use in the tablets, out of nearly 600 which the Assyrian language then contained. What earnest eyes must have pored over the tablets ruled in columns which show the differences in the two old languages, Sumerian and Akkadian, and over other tablets which translate these into Assyrian, with all kinds of exercises and examples, and even proverbs and riddles.

The history section of the royal library is very full, for the kings loved not only to record their doings and conquests, but to hunt up ancient inscriptions on cylinders and tablets, and to set forth dates and names of kings, with particulars of their buildings and wars, copied from various old chronicles. As we read, we realise the great stretch of centuries that goes back to the old Babylonian times, and we learn of the constant disputes about the boundaries of the two kingdoms of Babylonia and Assyria.

#### A KING'S LETTERS TO HIS BROTHER 2,500 YEARS AGO

Of the particulars of the building of temples and palaces there is no lack, and the records of Ashur-bani-pal's own history are endless. We can see letters to him from his twin-brother, whom he made Governor of Babylon; out of this grew a tragedy, for his brother rebelled and failed, and perished miserably in the flames of his palace. It was useless to plead for pardon with Ashur-bani-pal.

There is, indeed, no end to the varied interests of the tablets, and the study of them takes us into the very heart of life in Assyria during the times of its most powerful kings. For, besides all the old legends, and the language and history teaching, there are many hymns and prayers to the gods, showing the religious feeling of those far-off days, and countless letters on private and business matters showing the relations between man and man.

And, beside these tablets, we find others giving directions for making the images of the gods, for their transport, for supplying crowns for their heads, and furniture for their idolatrous worship. With regard to the business letters, the sales of slaves, houses, land, and

crops, the loans and repayments, all show that life was carried on in and around Nineveh under much the same conditions as in the old mother city and country of Babylon centuries before.

#### THE DESOLATION THAT CAME TO THE MIGHTY CITY OF THE GREAT KING

As we pore over the living story of the long-dead past, we notice how many of the tablets are cracked and broken, how many show marks of fire. For there came a day—only about thirty years after Ashur-bani-pal's death—when the quiet library was deserted, and scribes and students no longer passed careful hands along the narrow shelves on which the tablets were arranged, with a well-kept system of catalogues and labels, each class of literature by itself.

For the high tide of Assyrian power had begun to turn even before Ashur-bani-pal's death. Weak kings followed him, and the great nation of the Medes on the eastern borders defeated the hitherto invincible Assyrians, and were only held off from the capital by the sudden rush across Western Asia of the savage hordes of the Scythians, who destroyed everything that came in their way.

But the end was drawing near; and when the Medes joined with Nabopolassar, an Assyrian general commanding in Babylonia, the city of Nineveh, that great city of palaces and temples and books, was taken and destroyed by fire after a siege of two years. That was how the wooden shelves and fittings of the royal library were burnt, and the tablets fell in heaps in the ruins, broken and scorched. This was in the year 609 before Christ, over 2,500 years ago.

#### THE DEAD HEART OF A PROUD EMPIRE THAT HAS UTTERLY PERISHED

The destruction of the city meant death or slavery for those who had made their homes in it, and to the empty, desolate ruins came no fresh settlers. Slowly the stone slabs and monuments became covered with mud, as the soft bricks turned back to clay and earth, and the heavy rains and strong winds did their share in levelling and rounding the mounds, and in bringing vegetation to cover the grave of a city once full of life and toil, luxury and poverty.

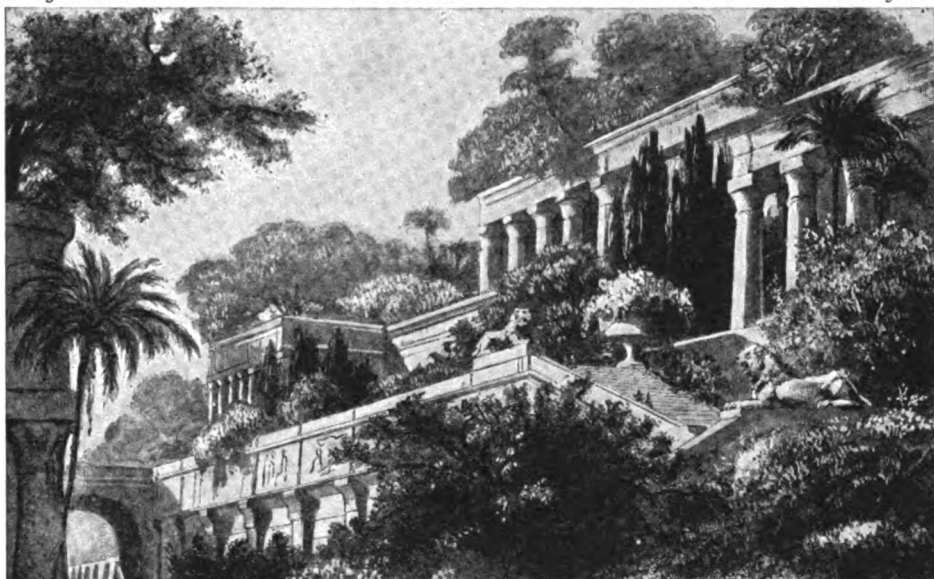
And not only Nineveh, but one by one, in like manner, the rest of the cities of Assyria died and were buried, and in time forgotten. For the northern

kingdom itself, independent for over a thousand years, passed on the fall of its capital under the power of the Medes, and the tributary states, fought for with such energy and cruelty, all fell apart.

Nabopolassar took Babylonia for his share, and founded the new Babylonian Empire, which lasted scarcely a hundred years. Those years are, however, full of events. Nabopolassar's son was Nebuchadnezzar II., already known to us in the story of Daniel's youth. It was this Nebuchadnezzar who took Jerusalem, seized and blinded the king, and completed the carrying into captivity of the Jews. The stories of Daniel and of the

the glazed tiles of different colours with which Nebuchadnezzar faced each of the seven storeys of his temple.

But even more interesting is his account of the tower of immense height which his building replaced. Its top had been left unfinished by its builders of olden time, so that rains and storms, through the centuries, slowly destroyed the walls and facings, till all sank into a state of ruin. Birs Nimroud, the present name of the mound which covers the ruins of this traditional Tower of Babel, as well as those of its gorgeous successor, is a few miles away from the dead heart of ancient Babylon.



**THE HANGING GARDENS OF BABYLON, ONE OF THE WONDERS OF THE WORLD** These gardens formed the greatest marvel in a palace of marvels, which Nebuchadnezzar called "the admiration of mankind." The gardens were laid out on terraces reared upon a series of mighty arches, and are said to have been built by Nebuchadnezzar for his favourite wife, who came to the flat plain of Babylon from a hilly land.

three young Hebrews who were thrown into the fiery furnace for refusing to worship the golden image that Nebuchadnezzar set up have always been favourites. We have often imagined the noisy scene on the plain of Dura—the shouting crowds, the jangling sound of the musical instruments, as well as the intense glow of heat from the great fire.

Nebuchadnezzar ever showed great zeal for the honour of the gods, and one of his most renowned works, that of restoring a very ancient temple to his special god, Nebo, touches with light one of the oldest stories of the world, that of the Tower of Babel. We can see in the cases at the British Museum

We read the marvellous story of Nebuchadnezzar's buildings and undertakings in the great city, larger, it is said, than our huge New York is now. It is all told in the bricks stamped with his name, in the inscriptions on slabs, in cylinders and bronze doorsteps, and we are filled with amazement and pleasure.

It is not difficult, either, to understand the intense pride of Nebuchadnezzar, walking about his palaces and temples and gardens, and saying: "Is not this great Babylon, that I have built for the house of my kingdom, by the might of my power, and for the honour of my majesty?" Alas! for the sudden and awful madness that overtook him,

that of believing that he was no longer a man, but a beast of the field. By no other means, save death, could he have been so stripped in a moment of power, majesty, and all that made life glad. For he went out alone to live in the fields and eat grass.

Daniel, though one of the captive race, acted as regent during the king's illness, having risen high in the state owing to his uprightness and ability. He also lived on through the reign of Nabonidus, who followed Nebuchadnezzar.

From the tablets of these reigns, giving particulars of shepherds and gardeners, sales and transfers of land, the making of canals and the care of the embankments, we can see that the prosperous agricultural and trading life went on in the new Babylonian Empire as it had done in the old.

The links between the old and new empires are many and deeply interesting; we may just mention two. There is a weight in one of the cases in the British Museum bearing an inscription stating that it is an exact copy of one made by Nebuchadnezzar, King of Babylon from 604 to 561 years before Christ, after the standard fixed by Dungi, King of Babylon, just 2,500 years before. Again Nabonidus was delighted to discover monuments of Burna-buriash, one of the writers of the Tel-el-Amarna tablets, a thousand years before his day; and those of Hammurabi, the great law-giver and canal-builder, who lived nearly a thousand years before Burna-buriash; and those of Sargon I., a thousand years earlier than the great king Hammurabi. Nabonidus had a son who was called

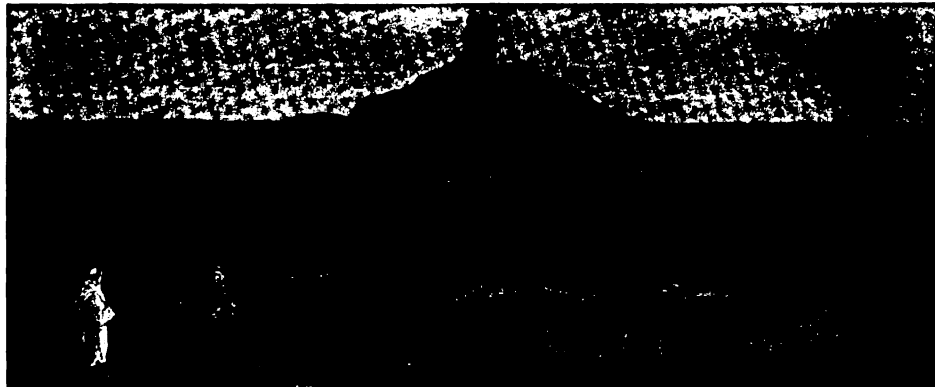
Belshazzar. The very mention of his name rouses us, for who has not heard of the great feast that he gave to a thousand guests, when wine was drunk out of the sacred vessels torn from the Jewish temple? The loud revelry is at its height, when suddenly it is frozen into stillness by the sight of some writing mysteriously thrown upon the palace wall. It is only the names of the common weights of the Babylonian market—like our pounds and ounces. What can it mean? While Daniel is being brought to explain it to Belshazzar and his terrified guests, let us look beyond the immense walls, thick and strong enough, the Babylonians believed, to keep any enemies out.

Enemies had been slowly closing in—men who are described as hardy warriors, riding well, speaking the truth, drinking water, not wine, while the careless feasted. These Persians, closely allied to the Medes, had been silently turning aside the course of the river which ran through the city, so that when the moment came they could pass in on its dried-up bed.

The writing was interpreted by Daniel as follows: "God hath numbered thy kingdom, and finished it. Thou art weighed in the balances, and art found wanting. Thy kingdom is divided, and given to the Medes and Persians."

Daniel's words were fulfilled that very night. Belshazzar was killed; but, as we learn from the cylinders, the Persians entered Babylon without fighting, and the fine city was spared tribulation when it passed under their rule.

The next story of Countries is on page 5057.



This mound, known as Birs Nimroud, is all that remains of the once mighty city of Borsippa, the sister city of Babylon, from which it stood about ten miles. We can see the remains of a great tower that Nebuchadnezzar built in honour of his god, Nebo, on what was supposed to be the site of the Tower of Babel.

THE STORIES OF JULES VERNE

THE second of Jules Verne's famous imaginative stories chosen for reading here is very different from "Round the World in Eighty Days." "Twenty Thousand Leagues under the Sea" is, perhaps, the best example of his tales of the marvels of invention, and we have to remember that when it was written, in 1873, nobody had yet succeeded in making a boat to travel under water. For that reason it was, in a way, a prophetic book, shadowing forth the wonderful possibilities of human ingenuity in exploring the ocean's unknown depths. Great progress has since been made in submarine vessels, but, of course, we are still far from seeing anything so extraordinary as the Nautilus of Verne's brilliant imagination. It is conceivable, however, that the day may come when submarines will be so developed as to enable men to explore the depths of the ocean with as much ease and confidence as they now sail on its surface.

# TWENTY THOUSAND LEAGUES UNDER THE SEA

IN the year 1866 the whole seafaring world of Europe and America was greatly disturbed by an ocean mystery which baffled the wits of scientists and sailors alike. Several vessels, in widely different regions of the seas, had met a long and rapidly moving object, much larger than a whale, and capable of almost incredible speed. It had also been seen at night, and was then phosphorescent, moving under the water in a glow of light.

There was no doubt whatever as to the reality of this unknown terror of the deep, for several vessels had been struck by it, and particularly the Cunard steamer Scotia, homeward bound for Liverpool. It had pierced a large triangular hole through the steel plates of the Scotia's hull, and would certainly have sunk the vessel had it not been divided into seven watertight compartments, any one of which could stand injury without danger to the vessel. It was three hundred miles off Cape Clear that the Scotia encountered this mysterious monster. Arriving after some days' delay at Liverpool, the vessel was put into dock, when the result of the blow from the unknown was thoroughly investigated. So many vessels having recently been lost from unknown causes, the



narrow escape of the Scotia directed fresh attention to this ocean mystery, and both in Europe and America there was a strong public agitation for an expedition to be sent out, prepared to do battle with, and if possible destroy, this narwhal of monstrous growth, as many scientists believed it to be.

Now I, Pierre Arronax, assistant-professor in the Paris Museum of Natural History, was at this time in America, where I had been engaged on a scientific expedition into the disagreeable region of Nebraska. I had arrived at New York in company of my faithful attendant, Conseil, and was devoting my attention to classifying the numerous specimens I had gathered for the Paris Museum. As I had already some reputation in the scientific world from my book on "The Mysteries of the Great Submarine Grounds," a number of people did me the honour of consulting me concerning the one subject then exercising the minds of all interested in ocean travel.

An expedition was also being fitted out by the United States government, the fastest frigate of the navy, the Abraham Lincoln, under command of Captain Farragut, being in active preparation, with the object of hunting out this wandering



monster which had last been seen three weeks before by a San Francisco steamer in the North Pacific Ocean. I was invited to join this expedition as a representative of France, and immediately decided to do so. The faithful Conseil said he would go with me wherever I went, and thus it came about that my sturdy Flemish companion, who had accompanied me on scientific expeditions for ten years, was with me again on the eventful cruise which began when we sailed from Brooklyn for the Pacific and the unknown.

The crew of the frigate and the various scientists on board were all eagerness to meet the great cetacean, or sea-unicorn. My own opinion was that it would be found to be a narwhal of monstrous growth, for these creatures are armed with a kind of ivory sword, or tusk, as hard as steel, and sometimes nearly seven feet long, by fifteen inches in diameter at the base. Supposing one to exist ten times as large as any that had ever been captured, with its tusk proportionately powerful, it was conceivable that such a gigantic creature, moving at a great rate, could do all the damage that had been reported.

#### HOW WE FIRST SAW THE MYSTERIOUS TERROR OF THE SEAS

There was among our crew one Ned Land, a gigantic Canadian of forty, who was considered to be the prince of harpooners. Many a whale had received its death-blow from him, and he was eager to flesh his harpoon in this redoubtable cetacean which had terrified the marine world.

Week after week passed without any sign that our quest would be successful. Indeed, after nearly four months had gone, and we had explored the whole of the Japanese and Chinese coasts, the captain reached the point of deciding to return, when one night the voice of Ned Land was heard calling :

"Look out there ! The thing we are looking for on our weather-beam !"

At this cry the entire crew rushed towards the harpooner—captain, officers, masters, sailors, and cabin-boys ; even the engineers left their engines, and the stokers their furnaces. The frigate was now moving only by her own momentum, for the engines had been stopped.

My heart beat violently. I was

sure the harpooner's eyes had not deceived him. Soon we could all see, about two cables' length away, a strange and luminous object, lying some fathoms below the surface, just as described in many of the reports. One of the officers suggested that it was merely an enormous mass of phosphorous particles, but I replied with conviction that the light ~~was~~ electric. And even as I spoke the strange thing began to move towards us !

#### AT CLOSE QUARTERS WITH THE STRANGE LUMINOUS MONSTER

The captain immediately reversed engines and put on full speed, but the luminous monster gained on us and played round the frigate with frightful rapidity. Its light would go out suddenly and reappear again on the other side of the vessel. It was clearly too great a risk to attack the thing in the dark, and by midnight it disappeared, dying out like a huge glow-worm. It appeared again, about five miles to the windward, at two in the morning, coming up to the surface as if to breathe, and it seemed as though the air rushed into its huge lungs like steam in the vast cylinders of a 2,000 horse-power engine.

"Hum !" said I. "A whale with the strength of a cavalry regiment would be a pretty whale !"

Everything was in readiness to attack with the coming of the dawn, and Ned Land was calmly sharpening his great harpoon, but by six in the morning the thing had again disappeared, and a thick sea-fog made it impossible to observe its further movements. At eight o'clock, however, the mist had begun to clear, and then, as suddenly as on the night before, Ned Land's voice was heard calling : "The thing on the port-quarter !"

There it was, surely enough, a mile and a half away, now a large black body showing above the waves, and leaving a track of dazzling white as its great tail beat the water into foam.

#### WHAT HAPPENED WHEN NED LAND THREW HIS HARPOON

Moving rapidly, it approached within twenty feet of the frigate. Ned stood ready at the bow to hurl his harpoon, and the monster was now shining again with that strange light which dazzled our eyes. All at once he threw the harpoon. It struck on a hard body.

Instantly the light went out and two enormous water-spouts fell on our deck. A frightful shock followed, and the next moment I found myself struggling in the sea. Though a good swimmer, I kept afloat with some difficulty, and great was my joy when I heard the voice of the faithful Conseil, who had jumped in after me. Much stronger than myself, he helped me to remove some of my clothes, and thus we kept afloat until I fainted.

When I regained consciousness, I found myself on the top of what seemed to be a floating island, and there was Ned Land as well as Conseil. We were on the back of the mysterious monster, and it was made of metal! Presently it began to move, and we were afraid it might go below the surface.

Indeed, it seemed to be on the point of submerging, when Land hammered loudly on the metal plates, and in a moment an opening was made and the three of us were drawn inside by eight masked men. A door banged on us, and for half an hour we lay in utter darkness. Then a brilliant electric light flooded the cabin, a room of about twenty feet by ten, and two men entered. One was tall, pale, and dark-eyed, but magnificently proportioned.

#### WE BECOME PRISONERS OF CAPTAIN NEMO INSIDE THE SUBMARINE

Though we spoke to them in French, German, English, and Latin, they did not seem to understand, while their own speech was unintelligible to us. But they gave us clothes and food. After eating the food, which was strange but delicious, we all lay down and slept the sleep of sheer exhaustion.

Next day the tall man, whom I afterwards came to know as Captain Nemo, master of this marvellous submarine boat, came to me, and, speaking in French, said:

"I have been considering your case, and did not choose to speak till I had weighed it well. You have pursued me to destroy me. I have done with society for reasons of my own. I have decided. I give you choice of life or death. If you grant me a passive obedience, and submit to my consigning you to your cabin for some hours or days, as occasion calls, you are safe. You, Monsieur Arronax, have least cause to complain, for you have written

on the life of the sea—I have your book in my library here—and will benefit most when I show you its marvels. I love it. It does not belong to despots."

Clearly we could do nothing but submit, and afterwards Captain Nemo showed me his wondrous craft.

#### THE TREASURES AND THE MARVELS OF THE FIRST SUBMARINE VESSEL

It was indeed a thing of marvels; for, besides the dining-room, it contained a large library of twelve thousand volumes, a drawing-room measuring thirty feet by eighteen, and fifteen high. The walls of this apartment were adorned with masterpieces of the great painters, and beautiful marbles and bronzes. A large piano-organ stood in one corner, and there were glass cases containing the rarest marine curiosities which a naturalist could wish to see. A collection of enormous pearls in a cabinet must have been worth millions, and Captain Nemo told me he had rifled every sea to find them.

The room assigned to me was fitted up with every luxury, yet the captain's own apartment was as simply furnished as a monastic cell, but in it were contained all the ingenious instruments that controlled the movements of the Nautilus, as his submarine was named. The electricity was manufactured by a process of extracting chloride of sodium from the sea-water, but the fresh air necessary for the life of the crew could only be obtained by rising to the surface. The engine-room was sixty-five feet long, and in it was the machinery for producing electricity as well as that for applying the power to the propeller.

The Nautilus, Captain Nemo explained, was capable of a speed of fifty miles an hour, and could be made to sink or rise with precision by flooding or emptying a reservoir. In a box, raised somewhat above the hull and fitted with glass ten inches thick, the steersman had his place, and a powerful electric reflector behind him illumined the sea for half a mile in front.

#### HOW THE SMALL BOAT OF THE NAUTILUS COULD BE USED

The submarine also carried a small torpedo-like boat, fitted in a groove along the top, so that it could be entered from the Nautilus by opening a panel, and, after that was closed, the boat could be

detached from the submarine, and would then bob upwards to the surface like a cork. The importance of this and its bearing on my story will appear in due time.

It was on a desert island that Captain Nemo had carried out the building of the Nautilus, and from many different places he had secured the various parts of the hull and machinery, in order to maintain secrecy.

#### THE BEAUTY AND FASCINATION OF LIFE UNDER THE SEA

Deeply interested as I was in every detail of this extraordinary vessel, and excited beyond measure at the wonders which awaited me in exploring the world beneath the waves, I had still the feeling of a prisoner who dared scarcely hope that liberty might some day be obtained. But when the metal plates which covered the windows of the saloon were rolled back as we sailed under the water, and on each hand I could see a thronging army of many-coloured aquatic creatures swimming around us, attracted by our light, I was in an ecstasy of wonder and delight.

Then days would pass without Captain Nemo putting in an appearance, and none of the crew were ever to be seen. But the Nautilus kept on its journey, which, I learned, took us to the Torres Strait, the Papuan coast, through the Red Sea, through a subterranean strait, under the Isthmus of Suez, to the island of Santorin, the Cretan Archipelago, to the South Pole, on whose sterile wastes Captain Nemo reared his black flag with a white "N" upon it, and through the Gulf Stream.

Of the wonders of the deep, those amazing and beautiful specimens of unknown life that passed before my vision on this strange journey, never before seen by the eye of any naturalist, I cannot here enter into particulars. But it must not be supposed, prisoners though we were, that we never emerged from the interior of the Nautilus.

#### WE ARE INVITED TO JOIN A SUBMARINE HUNTING EXPEDITION

One of my first surprises, indeed, was to be invited by Captain Nemo to accompany him on a hunting expedition in the marine forest that grew about the base of the little island of Crespo, in the North Pacific Ocean. We were told to make a hearty breakfast, as the jaunt

would be a long one. This we did, for we had soon become accustomed to the strange food, every item of which was produced by the sea.

For our submarine excursion we were furnished with diving dresses of seamless india-rubber, fitted on the shoulders with a reservoir of stored air, its tubes opening into the great copper helmet. We even had powerful air-guns and electric bullets, which proved weapons of deadly precision. When inside our diving dresses, we could not move our feet on account of the enormous leaden soles, so that we had to be pushed into a compartment at the bottom of the vessel, and the iron doors secured behind us. Water was then pumped in, and we could feel it rising around us, until the compartment was full, when an outer door opened and we stepped on to the floor of the sea.

For some considerable distance we walked along sands of the most perfect smoothness, and then had to make our way over slimy rocks and treacherous masses of seaweed, before we reached the fairy-like forest under the sea, where all the branches of the marvellous growths ascended perpendicularly.

#### THE MYSTERY OF THE WOUNDED ENGLISHMAN AND A BURIAL IN THE SEA

It was indeed a rare experience for me, who had written "The Mysteries of the Great Submarine Grounds," thus to see, at first hand, the life of which I had only been able to speculate on before. We captured many rare specimens, and shot a fine sea-otter, the only known quadruped that inhabits the rocky depths of the Pacific. It was five feet long, and its skin was worth a hundred pounds.

So constantly was I enchanted with the wonders of our journey that day succeeded day without my taking note of them; but Captain Nemo, for all his kindness, still remained as mysterious as the Sphinx. One day he became violently agitated after looking through the glass at a point indicated by his lieutenant, and I and my companions were immediately imprisoned in darkness, as we had been when first taken into the Nautilus. When I awoke next morning the captain took me to see a wounded Englishman whose head had been shattered, and on my stating that the man could not live for two hours, the dark eyes of the captain seemed to

fill with tears. I thought that night I heard sounds of a funeral hymn, and next day I was taken to a submarine forest of coral, where they buried the man. This was really a little cemetery beneath the sea, as I gathered from the coral cross which had been erected there. Ned Land, unlike me, was soon satisfied with what he had seen of the submarine world, and had now but one thought of escape; but no opportunity had yet offered. We were sailing up the eastern coast of South America, and by May 17 were some five hundred miles from Heart's Content. There I saw, at a depth of more than fifteen hundred fathoms, the great electric cable lying at the bottom of the ocean. The restlessness of poor Ned Land was at its height when he had a glimpse of the American shore; but Captain Nemo bent his course towards Ireland, and then southward, passing within sight of Land's End on May 30.

**OUR VISIT TO THE OCEAN GRAVE OF THE OLD AVENGER**

All the next day the vessel seemed to be making a series of circular movements, in some endeavour to locate a particular spot, and the captain was gloomier than I had ever seen him, having no word for me. The following day, which was beautifully clear, we could make out, some eight miles to the eastward, a large steam vessel flying no flag. Suddenly, after using his sextant, the captain exclaimed: "It is here!"

Presently the Nautilus sank to the bottom of the sea. When at rest the lights were put out and the sliding panels opened. We could now see on our starboard the remains of a sunken vessel, so encrusted with shells that it must have lain there a great many years. As I stood there wondering what might be Captain Nemo's reason for his manœuvres, he came to my side and, speaking slowly, said:

"That was the Marseillais, launched in 1772. It carried seventy-four guns, and fought gallantly against the Preston, was in action again at the siege of Granada, and in Chesapeake Bay. Then in 1794 the French Republic changed the vessel's name, and it joined a squadron at Brest to escort a cargo of corn coming from America. The squadron fell in with an English man-o'-war, and seventy-two years ago to this very

day, on this very spot, after fighting heroically, until its masts were shot away, its hold full of water, and a third of its crew disabled, this vessel preferred sinking, with its 356 sailors, to surrendering. Nailing its colours to the mast, it sank beneath the waves to the cry of 'Long live the Republic!'"

"The Avenger?" I exclaimed.

"Yes, the Avenger. A good name!" said the captain, with a strange seriousness, as he crossed his arms.

**THE BEGINNING OF ANOTHER GREAT TRAGEDY OF THE OCEAN**

I was deeply impressed with his whole bearing while he recalled these facts. It was clearly no common spite against his fellow-men that had shut up Captain Nemo and his crew in the Nautilus.

Already we were ascending, fast leaving the grave of the old Avenger. When we had reached the surface we could see the other vessel steaming towards us. A low boom greeted the Nautilus as its upper part showed above the water. Ned Land, aflame once more with hope of escape, made out the vessel to be a two-decker ram, but she showed no flag at her mizzen. It seemed for a moment there might just be some chance of escape for us three prisoners, and Ned declared he would jump into the sea if the man-o'-war came within a mile of us. Just then another gun boomed out. She was firing at us.

It flashed across my mind at that moment that as those on board the Abraham Lincoln, having seen the effect of Ned Land's harpoon when it struck the Nautilus, could not but have concluded their enemy was no monster of the deep—though indeed a monster of man's contriving—the warships of all nations would now be on the look-out for the Nautilus, and we on board it could scarcely hope for mercy.

**CAPTAIN NEMO VOWS VENGEANCE AND SHOWS HIS BLACK FLAG**

The shot rattled about us as we stood on the opened upper deck of the submarine, and Ned Land, in a mad moment, waved his handkerchief to the enemy, only to be instantly felled by the iron hand of Captain Nemo. Then, frightfully pale, the captain turned towards the approaching man-o'-war, and, in a voice terrible to hear, cried: "Ah, ship of an accursed nation, you

know who I am ! I do not need to see your colours to know you. Look, and see mine ! ”

So saying, he unfurled his black flag, and then sternly bade us go below, just as a shell struck the Nautilus, and rebounded into the sea. “ You have seen the attack,” he said more calmly. “ I shall sink yonder ship, but not here—no, not here. Her ruins shall not mingle with those of the Avenger.”

**WE HAVE HIGH HOPES OF ESCAPE, BUT ARE PRISONERS STILL**

Having no choice but to obey, we all went below, and the propeller of the Nautilus was soon lashing the water into creamy foam, taking us beyond the range of fire. I held my peace for a time, but, after some deliberation, ventured to go up in the hope of dissuading Captain Nemo from more destruction. His vessel was now coursing round the other ship like a wild beast manœuvring to attack its prey, and I had scarcely spoken when the captain turned on me fiercely, commanding silence.

“ Here I am the law and the judge,” he said, almost in a shriek. “ There is the oppressor. Through him I have lost all that I have loved, cherished, and venerated—country, wife, children, father, and mother. I saw all perish ! All that I hate is represented by that ship ! Not another word ! ”

In the face of such fierce hatred it was useless to try persuasion. I and my companions resolved to attempt escape when the Nautilus made the attack. At six next morning, being the second day of June, the two vessels were less than a mile and a half apart. Suddenly, as the three of us were preparing to rush on deck and jump overboard, the upper panel closed sharply. Our chance was gone !

**HOW THE NAUTILUS DESTROYED THE UNKNOWN MAN-O'-WAR**

Next moment the noise of the water rushing into the reservoir indicated that we were sinking, and in a moment more the machinery throbbed at its greatest speed as the Nautilus shot forward under the sea. Then the whole submarine trembled ; there was a shock, and then a rending jar above. The terror of the seas had cut its way through the other vessel like a needle through sailcloth ! Horror-stricken, I rushed into the saloon and found Captain Nemo, mute

and gloomy, standing by the port panel, which had instantly been slid back, watching with a terrible satisfaction the injured vessel sinking with all its crew beneath the waves. The Nautilus sank with it, so that its terrible captain might lose nothing of the fascinating horror presented by the spectacle of his victims descending to their ocean grave. When we had seen all, he went to his room, and, following him, I saw on the wall the portraits of a woman, still young, and two little children. He looked at them, and as he stretched his arms toward them the fierce expression of hate died away from his face. He sank down on his knees, and burst into deep sobs. I felt a strange horror for this man, who, though he might have suffered terribly, had no right to exact so terrible a vengeance.

The Nautilus was now making its top speed, and the instruments indicated a northerly direction. Whither was it flying ? That night we covered two hundred leagues of the Atlantic. Onward we kept our course, the speed never lessening, and for fifteen or twenty days, during which we prisoners never saw the captain or his lieutenant, this headlong race continued.

**OUR FLIGHT THROUGH THE ATLANTIC, AND ANOTHER PLAN OF ESCAPE**

Poor Ned Land was in despair, and Conseil and I had to watch him carefully lest he might kill himself. One morning he said to me :

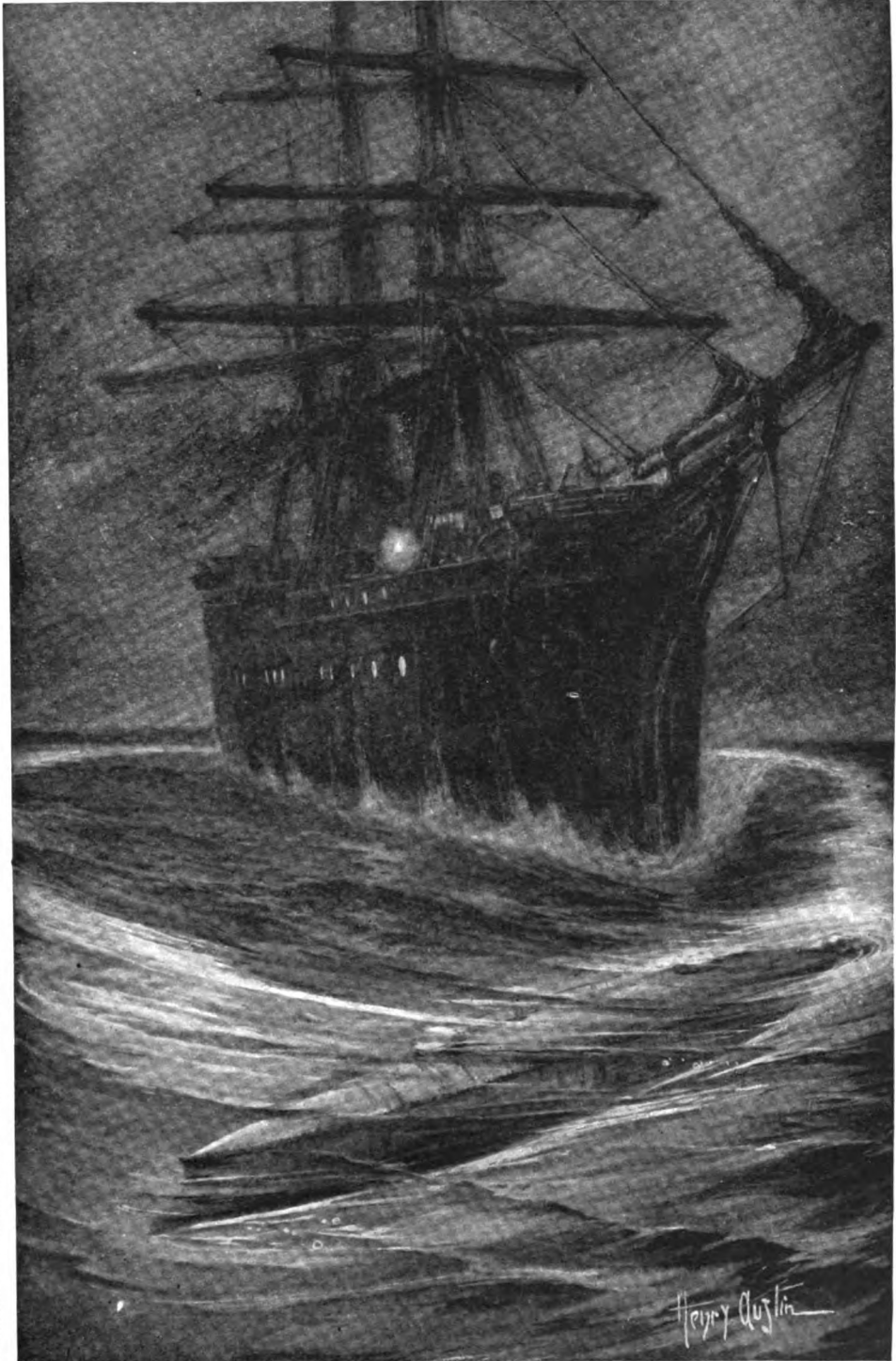
“ We are going to fly to-night. I have taken the reckoning, and make out that twenty miles or so to the east is land. I have got a little food and water, and Conseil and I will be near the opening into the small boat at ten. Meet us there. If we do not escape, they sha'n't take me alive.”

“ I will go with you,” I said. “ At least we can die together.”

Wishing to verify the direction of the Nautilus, I went to the saloon. We were going N.N.E. with frightful speed at a depth of twenty-five fathoms. I took a last look at all the natural marvels and art treasures collected in this strange museum, a collection doomed to perish in the depths of the ocean with the man who had made it. Back in my own room I donned my sea garments, and placed all my notes carefully about my clothing. My heart



## THE HIDDEN TERROR OF THE SEAS



The wonderful submarine vessel, invented and commanded by Captain Nemo, circled round the man-o'-war, like a beast of prey about to attack its victim, and playing with it before it strikes the death-blow.

was beating so loudly that I feared my agitation might betray me if I met Captain Nemo. I decided it was best to lie down on my bed in the hope of calming my nerves, and thus to pass the time till the hour determined upon for our attempt. Ten o'clock was on the point of striking, when I heard Captain Nemo playing a weird and sad melody, and I was struck with the sudden terror of having to pass through the saloon while he was there. I must make the attempt, and softly I crept to the door of the saloon and softly opened it. Captain Nemo was still playing his subdued melody; but the room was in darkness, and slowly I made my way across it to the library door. I had almost opened this when a sigh from him made me pause.

He had risen from the organ, and, as some rays of light were now admitted from the library, I could see him coming toward me with folded arms, gliding like a ghost rather than walking. His breast heaved with sobs, and I heard him murmur these words, the last of his I heard: "Enough! O God, enough!" Was it remorse escaping thus from the conscience of this mysterious being?

#### MY DESPERATE DASH FOR LIBERTY AND THE LAST OF CAPTAIN NEMO

Had I not seen it begin with the tears in his eyes at the death of the Englishman whom he had buried in the coral cemetery, and who was doubtless a victim of one of his acts of destruction?

Now rendered desperate, I rushed into the library, up the central staircase, and so gained the opening to the boat where my companions were awaiting me. Quickly the panel through which we went was shut and bolted by means of a wrench which Ned Land had secured. The opening of the boat was also quickly fastened after we had got inside, and the harpooner had begun to undo from the inside the screws that still fastened the boat to the Nautilus. Suddenly a great noise was heard within the submarine. We thought we had been discovered, and were prepared to die defending ourselves. Ned Land stopped his work for the moment, and the noise grew louder. It was a terrible word, twenty times repeated, that we heard. "The Maelstrom! The Maelstrom!" was what they were crying. Was it to this, then, that the Nautilus

had been driven, by accident or design, with such headlong speed? We heard a roaring noise, and could feel ourselves whirled in spiral circles. The steel muscles of the submarine were cracking, and at times in the awful churning of the whirlpool it seemed to stand on end. "We must hold on," cried Land, "and we may be saved if we can stick to the Nautilus."

#### HOW THE SMALL BOAT SAVED US FROM THE TERROR OF THE MAELSTROM

His anxiety now was to make fast the screws that bound the boat to the submarine, but he had scarcely finished speaking when, with a great crash, the bolts gave way, and the boat shot up, released from the larger vessel, into the midst of the whirlpool. My head struck on its iron framework, and with the violent shock I lost all consciousness.

How we escaped from that hideous gulf, where even whales of mighty strength have been tossed and battered to death, none of us will ever know! But I was in a fisherman's hut on the Lofoden Isles when I regained consciousness. My two companions were by my side, safe and sound, and we all shook hands heartily. There we had to wait for the steamer that runs twice a month to Cape North, and in the interval I occupied myself revising this record of our incredible expedition in an element previously considered inaccessible to man, but to which progress will one day open up a way.

I may be believed or not, but I know that I have made a journey of twenty thousand leagues under the sea.

#### WHAT IS THE FATE OF CAPTAIN NEMO AND HIS MARVELLOUS SUBMARINE?

Does the Nautilus still exist? Is Captain Nemo still alive? Was that awful night in the Maelstrom his last, or is he still pursuing a terrible vengeance? Will the confessions of his life, which he told me he had written, and which the last survivor of his fellow-exiles was to cast into the sea in an airtight case, ever be found?

This I know, that only two men could have a right to answer the question asked in the Ecclesiastes three thousand years ago: "That which is far off and exceeding deep, who can find it out?" These two men are Captain Nemo and I.

The next Famous Books are on page 5095.



The first picture shows the "bully" at the start of the game, and on the right we see a tussle for the ball.

## HOCKEY FOR BOYS AND GIRLS

**H**OCKEY is a splendid winter game for both boys and girls, and it can be played in any level field of a good size.

A full-sized hockey-ground should be 100 yards long, and from 55 to 60 yards broad; but a smaller ground, about 80 yards by 50, is quite big enough for young players. The ground must be marked out as shown in the diagram on page 4995, with chalk lines two inches wide; and the game lasts for seventy minutes, the players changing over at half-time.

In the centre of each goal-line stands the goal, which consists of two posts seven feet high and two inches square, set four yards apart and joined together at the top by a horizontal crossbar with square edges. For match play a net is attached to the posts and crossbar, and fastened to the ground behind. In front of each goal a "striking circle" must be marked out, and no goal can be scored unless the ball is hit through the posts from inside this "circle." It is made by drawing a white line, four yards long, parallel to the mouth of the goal and fifteen yards away from it, and continuing this each way as far as the goal-line by drawing two quarter-circles, having the two goal-posts as their centres. The lines themselves count as part of the striking circle.

A hockey-ball is a cricket-ball painted white, or made of white leather. A hockey-stick must be made of wood, and must have a flat surface on its left side only, and be of such size that it can be passed through a two-inch ring. It must have no metal fittings, and must not weigh more than 28 ounces.

For a match each team consists of eleven players. The object of the game is to put the ball through our opponents' goal as often as possible, and to prevent them from scoring. A team is generally

CONTINUED FROM 4990



divided into five forwards, three half-backs, two backs, and a goalkeeper. The diagram on page 4995 shows the position to be taken up by each player before beginning to play.

We may dribble the ball, or hit it, or pass it to another player with the stick; and this matter of passing is very important indeed, because, in hockey, combination is the secret of success, and one selfish or unskilful player may spoil the chances of his side and thus lose the game.

The forwards must be swift runners, able to dribble and dodge and shoot, and to hit a ball from a pass without first stopping it dead. The half-backs must help the attack by constantly feeding their forwards with the ball.

The backs must be strong and plucky players, able to hit hard and straight, to stop hard hits and tackle rushes.

The goalkeeper is the last line of defence; his duty is to prevent the ball from passing between the posts, and to send it away from the neighbourhood of the goal. He may kick the ball when he is inside his own striking circle. If there is no goalkeeper, one other player may be chosen who will have the right to kick the ball.

The game is started by the two rival centre-forwards "bullying off" in the middle of the centre-line, while the rest of the players must stand nearer their own goal-lines than the ball is. To bully off, each of the two centre-forwards, both standing squarely opposite each other and facing the side-lines, must first strike the ground on his own side of the ball, and then his opponent's stick over the ball, three times alternately. Either may then strike the ball independently, thus putting it into play. This central bully also takes place after half-time and whenever a goal

# HOW TO PLAY THE GAME OF HOCKEY



The first picture shows a useful back-hand stroke to play when in difficulties. The stick is turned round so as to strike the ball with the flat side. In the second picture we see the correct position for rolling in the ball when it has gone over the touch-line. The roller-in must stand quite outside the field of play. Good dribbling is most important in hockey. The ball is hit gently forward, again and again, by the player as she herself runs forward.



This player is stopping the ball in mid-air; she must not hold the ball, but must drop it at her feet and hit it immediately.

By crossing her leg over that of the player behind her, the player in front is fouling. No player must strike or hook an opponent's person, or run between her and the ball.

The ball can be stopped dead with the foot, as the girl in this picture is doing, with the hand, or with any part of the body.



The player on the left has passed all her opponents but one, and is just about to try and hit the ball has been hit past the defending goalkeeper and past the goalkeeper, who stands to the right, and through the goal from a spot within the 15-yards striking into the goal, which can be seen in the picture. circle, which is necessary if the goal is to count.

has been scored. A goal is scored when the ball passes entirely over the part of the goal-line between the posts, after being hit by, or having glanced off, the stick of an attacker who is inside the striking circle.

We may catch the ball when it is in play, but must immediately let it fall straight down to the ground. We may also stop it dead with the feet or with any part of the body. It is against the rules to raise any part of the stick above the shoulder while striking the ball; to touch the ball with the back of the stick, or to fence or hook sticks with any opponent who is not within striking distance of the ball, or to strike or hook an opponent's person; to charge, kick, collar, or trip up an opponent; to obstruct an opponent by running between him and the ball, or to touch him when running across him from the left, unless we touch the ball first; to pick up, carry, or kick the ball, or to knock it forward or backward except with the stick. The following are the penalties for breaking any of the above rules.

If the offence is committed by either side outside the striking circle, or by the attacking side within their opponents' striking circle, a "free hit" is given. While this is being taken, none of the offender's side are allowed within five yards of the ball, and the player who takes the free hit may not play the ball again until it has been touched by another player; if he does, a free hit is given to the other side. If the offence is committed by the defending side within their own striking circle, "off-side" is punished with a free hit on the spot, and the other offences with a "penalty bully." If the rules for the penalty bully are broken, the penalty bully is taken over again; if the rules for the free hit are broken by the defenders inside their own circle, a "penalty corner" is given.

When a player sends the ball right over the side-line, it must be "rolled in" by one of the opposite side. The "roller-in" must stand at the point where the ball crossed the side-line, and, with his stick and both feet outside the line, roll the ball along the ground, otherwise it is a "foul throw." He may send it in any direction and to any distance. The moment the ball leaves the hand, it is in play, but until then all other players must stand at least five yards from the side-line.

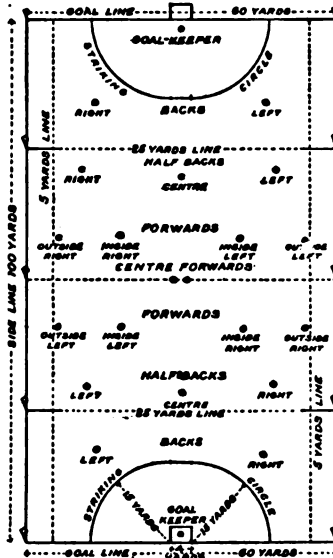
When a player of one team is "rolling in" or hitting the ball, any player of the same team who is at that moment nearer the opponents' goal-line than the striker or roller-in is off-side, if there are not at least three opponents between him and the enemy's goal-line. He may not take any part in the

game at all until the ball has been touched or hit by an opponent. But we cannot be off-side in our own half of the ground, or if the ball was last touched or hit either by an opponent or by one of our own side who, at the time of hitting, is nearer our opponents' goal-line than we are.

If the ball is unintentionally sent behind the goal-line by one of the defending team who is within the 25-yards line, the umpire must give a "corner" hit to the attacking team; or he may give a penalty corner.

For an ordinary corner all the members of the defending team must stand behind their own goal-line; the attacking team stand outside the striking circle in the field of play. One of the attacking team then takes a hit from any point on the goal-line or side-line within three yards of the nearest corner flag. No player may stand within five yards of the striker while the corner hit is being

taken, and no goal can be scored from a corner hit unless the ball has first either been stopped motionless on the ground by one of the attackers, or touched the stick or the person of one of the defending side. The player who takes the corner hit cannot touch the ball again until it has been hit by another player. When a penalty corner has been awarded, one of the attacking team takes a hit from any part of the goal-line not less than ten yards from the nearest goal-post. All other players stand as for an ordinary corner. The moment the corner or the penalty corner has been taken and the ball is put into play, the defenders rush forward to defend their goal-line. A free hit is taken from the spot where the offence took place. No other player may stand within five yards of



Hockey-field and position of players

the striker, who, after taking the hit, must not touch the ball again until some other player has touched it.

A penalty bully is played on the spot where the rule was broken, by the player who has broken the rule and some member of the opposing team. All other players must keep beyond the nearer 25-yards line in the field of play.

If during a penalty bully either player sends the ball over the goal-line between the posts, it counts a goal to the attackers. If the offender sends the ball behind any part of his own goal-line outside the goal-posts, the bully must be taken again. If either player sends the ball outside the striking circle, the game is restarted by an ordinary bully on the centre of the nearest 25-yards line; the same is also done if, in the penalty bully, the attacker happens to send the ball over the goal-line outside the goal-posts.



## A MANTEL-BORDER IN APPLIQUE' WORK

APPLIQUE' work is the application of one material to another. It is one of the many different ways of working used in embroidery, and is an excellent method of introducing a fine big piece of colour into a pattern without all the labour which would be required if we tried to cover the same space with stitches close together.

We are going to make a mantel-border of linen, and decorate it with appliqué in colours. First we must get a yard and a half of cream linen for the mantel-border itself, and a quarter of a yard of green, and a quarter of a yard of brown linen for the appliqué work. We are going to make a little border of boats with sails up all along our mantel-cover, as shown in picture 1, and each will have a brown sail and a green hull.

We must get a cinnamon-colour brown, not a chocolate shade, and a pretty, soft green like a new leaf. We are going to cut out the shapes of the sails and boats from the green and brown linen, and sew them down to the cream ground with embroidery silk.

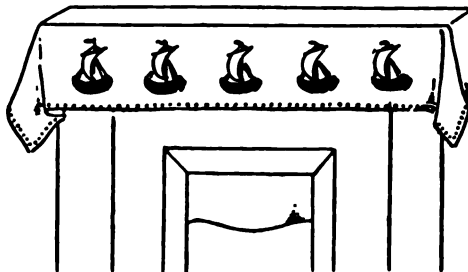
The first thing to do is to cut our cream linen into a piece which will fit the mantel-shelf, leaving a piece twelve inches long to hang down in front and at the ends. This must be neatly hemmed to an inch-wide hem all round with a small needle and No. 60 white cotton. The hemming stitches must on no account show on the front.

It is on this part which hangs down that the embroidery is to be done; the part which lies on the shelf can, if necessary, be kept in place by a couple of drawing-pins, one at each end, or, in the case of a cast-iron mantel-piece, it will be found that the weight of the clock or ornaments is quite sufficient to keep the cover from slipping.

The next thing to do is to copy on paper the sail and boat shapes twice the size of those shown in picture 2. This is to be used as a pattern for cutting out the coloured linen.

Five little ships will be enough for a small mantel-border, one in the middle and two at equal distances each side, a few inches apart—say, three inches for a small border

and four or five for a long one. They must be placed about two inches above the hem. First of all, iron out the brown and green linen quite flat, and cut from the pattern, *very neatly*, five little brown sails and five little green boats. We must use sharp scissors, and take care not to fray the edges of the linen. Placing the centre boat in position, as seen

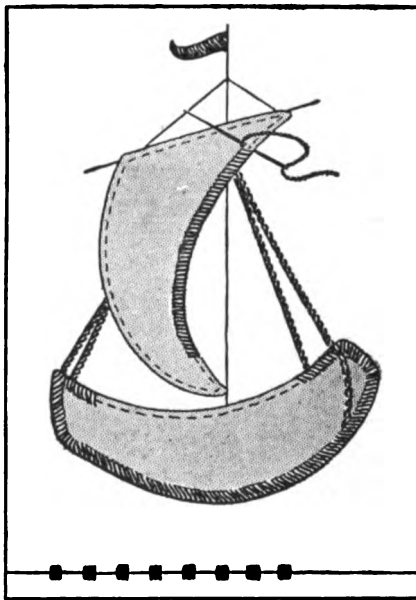


1. The finished mantel-border

in picture 1, we fix it with a pin, while we tack it down with a needle and cotton all round a little way from the edge. We should next fix the sail in the same way, keeping it flat and avoiding puckers. Now we have one complete boat ready for working. The embroidery is done with mallard floss silk, costing only a

few cents per skein. We should get brown and green silks to match the linen, using the *brown* silk to edge the *green* linen, and the *green* silk to edge the *brown* linen.

The edging stitch is done as shown in picture 2—simply "over and over," very close together so as not to show any of the edge of the appliqué. We must keep it very neat, and the same width all the way round—that is, about one-sixth



2. How the pattern is worked

of an inch. The appliqué must not be puckered or moved in any way; but this will not be likely to happen if we have tacked it down firmly at first. When both the sail and hull are fixed and fastened by the silk border, we can get a ruler and pencil and draw in on the cream ground the mast-lines shown in the picture; a B B pencil shows up quite sufficiently for working purposes. Then embroider over the pencil-lines in brown silk, using an ordinary crewel-stitch, worked very neatly with the stitches close together, and taking care to put each new stitch in where the last one came out. This is the whole secret of keeping a perfectly straight line when using a single stitch.

Crewel-stitch is not worked along the material like hemming, but upwards, as we can see by picture 4. We must knot the thread, and, starting from the back of the material at the bottom of the line we are going to embroider, make a stitch one-sixth of an inch long, by pushing the needle through from the front to the back again,

bringing it up in the centre of this stitch. Then make another stitch the same length, still keeping on the pattern line, and bring the needle up again where the first stitch left off.

The flag is so simple in shape that we should have no difficulty in copying it in freehand from the picture, and drawing it on the linen in pencil. It must be neatly worked in scarlet silk, not merely outlined, but filled completely in.

The little line which shows the prow of the boat is quite simple to draw. We notice that it curves just a little in the middle. It is worked over exactly as the mast-lines are done. When the design is all complete, we should give it a final pressing with a warm iron by laying it face downwards on a piece of flannel, and pressing it well on the *wrong* side.

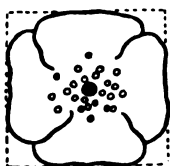
Appliqué makes an excellent decoration for larger things like curtains, table-covers, and so on. For instance, a handsome pair of dark green art serge curtains could be effectively decorated with a border of huge poppies, each cut out of scarlet linen, and sewn down with black wool.

The centres and stamens of the flowers are also embroidered in black. Each poppy would be about seven inches across, and the flowers should be arranged in a straight line right across the bottom of the curtain—about twenty inches from the hem.

Each poppy should just touch the other, and together they form a particularly handsome border. Picture 3 shows one of the poppies, in case we care to try to do a curtain or a table-cover.

For the mantel-border, which is shown in picture 1, the poppies would be used as a border all round, and in either case we must make an enlarged drawing for a pattern. Notice that the poppy itself just fits a square; this will help us to draw it easily and correctly.

As a finish to the mantel-border, a line of dots, each one made of three stitches close together, should go all along the edge, as shown in picture 1. This form of decoration would also suit the table-cover. We can see how the dots are done in picture 2. The thread between the sets of dots should not be cut off, but carried on from one to the other.



3. The poppy pattern



4. Crowel-stitch

## THE PUZZLE OF THE KING'S GUARD

A CERTAIN king was staying at one of his hunting lodges in the forest, and in this house there were nine rooms. The king slept in the central room, and arranged that the twenty-four soldiers who formed his guard should be so disposed that there should be nine on each side of the lodge. They were placed as in the diagram—three in each room. The king's stay was longer than he had originally intended, and the soldiers asked if they might meet in one another's rooms of an evening, for games and conversation. This the king agreed to, but on the condition that there should always be nine on each side of the house. Before retiring to rest on the night that this new arrangement was made, the monarch thought he would go round the lodge, and count the soldiers on each side, to see that his orders were being obeyed, and that none of the soldiers had gone to the village close by, or had allowed any strangers to visit them in the lodge. He found that there were just nine on each side of the house, and so he went to rest feeling that none of his men were absent.

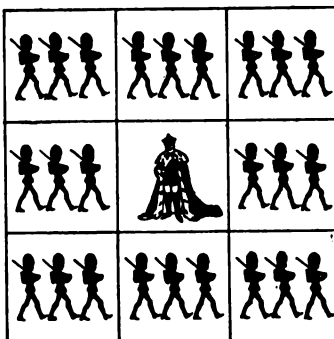
And yet, all the time, four of them had gone to the village, and were not in the house. How had the men contrived with four of their number away to maintain the full number of nine on each side of the lodge?

The next night instead of any of the soldiers going to the village, four of the villagers who were friends of theirs came to the hunting lodge, and were let in, which was against the rules. But when the king looked round, he thought all was right because there were still nine men, and nine only,

on each side. How was this? On the third night, eight visitors came in, and now there were thirty-two men in the house, but as the king still found nine on each side, he did not notice the new additions. The soldiers so enjoyed the visits of their friends that on the next night they let in twelve of their friends, and now they found it difficult to know how to arrange the whole of the thirty-six individuals, so that there would be nine, and no more than nine on each side of the house. But

at last they did this, and thus deceived the king. On the fifth night, instead of inviting their friends to the king's lodge, eighteen of the soldiers remained behind, and so arranged themselves that there should be nine men on each side of the house, while the other six soldiers went away to the village.

How did the men manage to deceive the king on these five nights, and keep the same number of men on each side of the lodge, although the number of individuals in the house varied so greatly? The solutions to this interesting puzzle is given on page 5114.



The king and his guard

# HOW TO KNOW THE WOODS IN FURNITURE

As we examine the furniture in our homes, the tables and chairs, and bookcases and cabinets, or as we look round a furniture-dealer's shop, we see at once that different articles are made of different kinds of wood. Perhaps we have wondered what these various woods were called, what trees they came from, and in what parts of the world they grew; and it is intended to give here a few particulars which will help us to identify the woods of which most of our furniture is made.

## MAHOGANY

Perhaps the most conspicuous of all the timbers used for furniture is mahogany. We can tell it by its deep rich red colour, and it seems to take French polish better than other kinds of wood. There are two kinds of mahogany principally used in furniture making—Honduras mahogany, which has an almost straight grain, and Spanish mahogany, in which the grain is more twisted. This grain gives a dark, rather streaky appearance to the wood, which adds to its richness. But if we look out for a really deep red wood highly polished, we cannot very well mistake mahogany. We frequently see it used for shop fronts and for shop counters. Honduras mahogany comes from Central America and Spanish mahogany from the West Indies.

## WALNUT

Even more common than mahogany is walnut. This has a greyish-brown colour with black-brown pores, and is finely veined with darker shades of brown. It is the wood that the stocks of rifles are made of; and if we look at the rifles of soldiers, we shall at once see the colour and grain of walnut.

## ROSEWOOD

Another wood much used for cabinets and grand pianos is rosewood. This is a very richly coloured and marked timber, and is, perhaps, the handsomest of all woods used for furniture. The colour is a reddish brown—redder than

walnut and browner than mahogany. The texture is very fine, and the surface takes a high polish. The markings, which are of a handsome dark colour, vary very much, and are sometimes like watered silk, and at other times like a beautifully-grained marble. The rosewoods from Brazil are more handsomely marked than those from India.

## OAK

Oak is largely used in the making of furniture, and varies a good deal in its depth of colour. Some kinds are almost of a fawn, or buff, colour; other kinds are so dark as to be almost black, and in between there are various shades of brown. The grain of oak is unlike other woods used for furniture, being close, compact, and straight. The lines are not continuous, but are broken, being almost like dotted lines, giving the wood the appearance of being porous.

## EBONY

Ebony is a black, heavy, hard and shiny wood that comes from an Indian tree related to the date palm; but various other woods from Africa, the West Indies, and Texas are also called ebony. German ebony is simply yew-wood stained black. All these are so alike that only an expert can tell the difference.

## MAPLE

Maple is a fine-grained, light, yet low, wood, much used for bedroom furniture in the United States. Some of it is full of little whorls or specks. This is called bird's-eye maple, and is highly valued, though many people think it less beautiful than the plainer varieties.

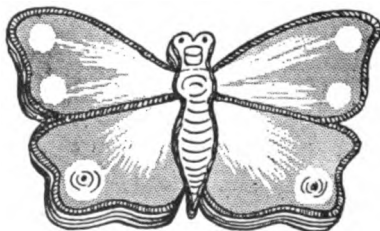
These are the principal woods used in furniture. Of course, much of the cheaper kinds of furniture are made of pine, and are merely stained or veneered—that is, covered with a very thin layer of some better kind of wood. In another part of this book will be found an account of an interesting hobby—that of collecting different kinds of wood.

# A BUTTERFLY NEEDLE-BOOK

A NOVEL little needle-book can be made in the form of a butterfly. If we turn to the coloured plate facing page 2983, we shall see many different kinds of butterflies which may suggest to us shapes and colours suitable for imitation.

Perhaps a scrap of peacock blue velvet is as pretty a material as we can choose. A piece of white nun's-veiling, delaine, or thin flannel for the leaves of the book and a small piece of stiff calico for the foundation will also be needed.

We first draw the outline of the butterfly on paper, using this as a pattern, and in doing this we shall not find any difficulty. Then we cut out the velvet which is to make the top of our needle-book, together with four thicknesses of nun's-veiling and one of calico.



The butterfly needle-book

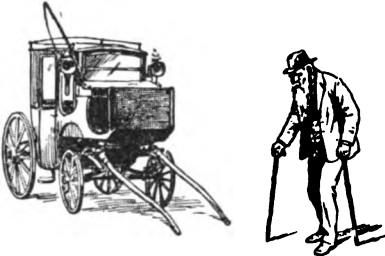


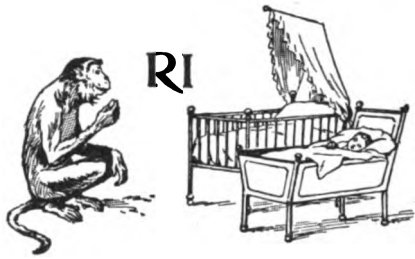


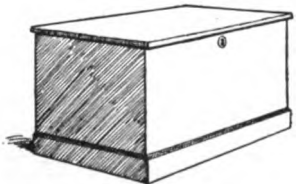
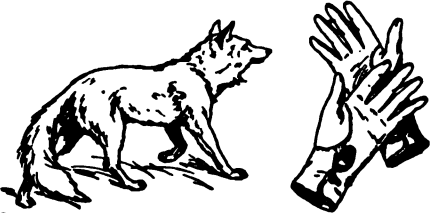


It may be that we possess the apparatus for doing poker-work, which is described on page 1280. If so, with it we can indent the outline of the wings, and mark the ridges on the body. Two spots are made in the back of the wings,

and pressure with some rounded tool, or even a thimble, will make the shiny markings left white in the picture on this page.

Placing the calico at the bottom, the layers of nun's-veiling next, and the velvet on the top, we take a needleful of brown thread—filoselle or mallard floss would do—and stitch round the outline of

the body through all the thicknesses, with long stitches. If we are accustomed to use brushes and paints, we can get pretty effects with hardly any trouble. A little lustre paint imitates well the brilliance of butterfly colours.

# CAN YOU READ THESE NAMES OF PLANTS?

<p>1</p> 	<p>2</p> 
<p>3</p> 	<p>4</p> <p>RI</p> 
<p>5</p> <p>OR</p> 	<p>6</p> 
<p>7</p> 	<p>8</p> 
<p>9</p> 	<p>10</p> 

Look at these ten sets of pictures carefully. By putting together the names of the objects in each set we are able to read the names of ten American plants. The correct solutions to this puzzle are to be found on page 5114.

# BLINDFOLD GAMES FOR BOYS AND GIRLS

## BUFF WITH A WAND

ONE of the players, called Buff, is blindfolded, and stands with a cane in his hand in a circle made by the rest of the players. The players dance round him while someone plays a quick tune on the piano, but they all stop if the music suddenly ceases, and Buff points with his wand towards anyone in the circle. The player so pointed at takes hold of the end of the wand, while Buff gives a cry in imitation of the voice of some animal or bird. The person holding the wand answers in the same manner, and if, by the sound, Buff can guess who the player is, they change places. If he fails, the music starts afresh, the players dance round, and he must try again to guess aright.

## BLIND MAN'S STAB

THE players stand at one end of the room. On the open floor, a few paces away, seven or eight pieces of paper about the size of postcards are scattered. On each of these it would be well to write some figure. One of the players is then blindfolded, and taking a stick, sharpened to a point at one end, makes three strides towards the pieces of paper.

Then he stabs at them with his stick, doing his best to pierce those scraps which he knows have the highest numbers on them. Three thrusts are allowed, after which he is led back to the starting point. If his aims were straight the numbers on the pieces of paper that he hit are reckoned to him. Another player then takes his place, and when each has had a turn, the one with the highest record to his or her name wins. Those stand the best chance who remember, after being blindfolded, where lie the papers with the highest numbers on them.

## JINGLING

IN this game every player except one is blindfolded. The one who can see carries a small bell, and moving about among the rest, jingles it every now and then, slipping away before he can be caught. It often happens that the players in their efforts to grab the jingler, catch one another, and are not convinced of their mistake till they hear the bell again in a distant part of the room. This is a good game if played with care, and not allowed to be too boisterous.

## SPOONS

THE blind man is given two large spoons, and, all the company having seated themselves in different parts of the room, he feels his way about until he discovers one of them. Then, with the two spoons, he feels them gently all over, to see if he can tell who it is he has found. Not a word must be spoken, not a sound must be made. If his guess is correct he hands the spoons to his captive who is blindfolded in turn. The rest of the players should all change places directly the new "spoons" is blindfolded. If not, he or she will remember where they were sitting and will name them easily.

## DRAWING A PIG

EVEN those who think themselves clever artists will be humbled when they play this game. Each of the party has a piece of paper and a pencil. At a word given by the leader, everyone must close the eyes, and draw on the slip of paper the outline of a pig, not forgetting to put in the eye. No one must look at what he has done till the leader gives permission. The result of drawing a pig in this manner is always surprising.

## PUTTING ON THE DONKEY'S TAIL

WE cut out from a sheet of brown paper the figure of a donkey, as large as possible, but without any tail. We fasten this up against the wall or on a screen. Then we cut out the tail, and pass a pin through that end of it which should be attached to the body. Each player in turn takes the tail in his or her hand, and walking up to the paper figure on the wall, *with both eyes tightly shut*, tries to pin it in the position it ought to occupy. The poor donkey will seldom get his tail put on properly, and the mistakes made are very funny. The winner is the player who puts the tail on nearest to its proper place.

## THE BLIND MAN'S BREAKFAST

BEFORE starting this game we ought to spread large sheets of paper on the floor. This being done, two players are blindfolded and seated opposite to each other, just within arm's reach. They are then given a slice of bread and butter each, or bread-and-milk and spoons, and proceed to feed one another as best they can. Their clothes should be well protected, for the spoons generally go anywhere but into their mouths. The blind man's breakfast is the funniest meal in the world.

## BLIND PARTNERS

THIS is a game for four players—two blindfolded and two not. Those who can see take one of the blindfolded as a partner, and all sit down, each at one side of a square table—the blind opposite the blind, with their partners to the right hand. A pack of cards is then scattered freely all over the table and, when ready, the blind players are told to supply their partners with "bricks" for building. They at once set about finding the cards, but to do this only one hand may be used, and they must on no account leave their seats.

The builders, however, may direct them by word of mouth, though by no other means, and while bricks are plentiful, things go fairly well. When they become scarce, excitement begins. The hands of the blind men fly over the table; their partners call out directions as fast as they can, only to see the brick they want carried off by the enemy. Sometimes a card is brushed from the table and time is lost before it can be found. But it must be found, and the pair who have the highest castle, or the most bricks, when all the cards have been used up, have won the game.



## BUILDING A GARDEN CAVE

OF recent years a great many important buildings and bridges have been made of what is called ferro-concrete, or reinforced concrete. This material is simply cement, such as most pavements are now made of, with iron or steel rods, or wires, hidden inside it to give it strength. Buildings made in this way are very strong, and they need not be nearly so thick as buildings made of ordinary stone, brick, or cement.

We are going to make a garden cave on the principle of the reinforced concrete construction, and to know that, as we build, we are following the principles which are also followed by the architects and engineers of great buildings and bridges will give us quite a new and real interest in our work. Our garden cave will be really a garden summer-house, but in appearance it will be not unlike one of the caves that the sea-waves have made as they have washed against the softer rocks of the sea-coast for thousands and thousands of years. Picture 1 shows the garden cave that we are about to make. It need not alarm us. Although it looks a big task, it is really very simple and easy. But it is not a task that anyone should undertake who is afraid of soiling his hands and clothes. An old suit of clothes should be worn for the purpose.

First we must make a framework of iron rods and wire netting. Let us get four iron rods of full length, which is from ten to fourteen feet, asking for rods that are three-eighths of an inch or half an inch thick. The thinner rods are thick enough, but it is really better to use the thicker kind for this purpose.

These iron rods are bent over into the form of arches, the particular size and shape being important. They should not be all of similar size or shape, because if they are all different the result will look more natural when the cave is finished.

We set up these four arches in accordance with the space we have at our disposal, and we put connecting bars from one end to the other so as to make the framework stand erect. These connecting bars, which may be of the same thickness as the arches, we tie to the arches with wire, and we must have a pair of wire-cutting pliers to do the work satisfactorily. We can put the connecting bars at any place where we think they will best give strength to the structure, and the positions seen in picture 2 need not be followed closely, as they are only a suggestion of what might be done.

When the framework has been made, we

cover it all over with wire netting, leaving blank only the place for an entrance and any other aperture, such as that seen in picture 1, that we may desire to make. The netting should be of wide mesh, say, two inches.

Now we must see what other material we require. We must have a bag of Portland cement, which will cost about two dollars for a two-hundredweight bag, three or four sacks of common gas coke, which is sold by most gas companies at a low price, and a good heap of sand.

Then we shall want a box, about a foot square or larger, in which we can mix our cement. If we have got all these things, we are quite ready to proceed.

We mix some sand and cement together—about equal quantities of each—in the box and pour in some water, sufficient to make the mixture into the thickness of gruel. Then we stir it about thoroughly with a stick, and roll some of the pieces of coke in the cement mixture. When they are well covered, we take them piece by piece

and force them as tightly as we can into the openings of the wire netting. We go over the entire structure like this, and we shall be able to do it much better if we begin at the top; otherwise we shall soil ourselves unnecessarily.

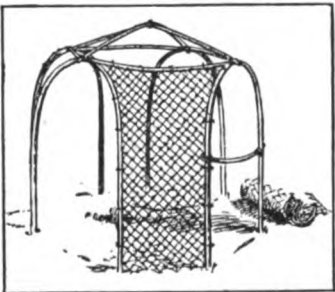
That part of the work will take us some time. The best way to do it is for one worker to keep mixing the cement, sand, and water together in the box as required, and the other worker should push the cement-covered coke into the meshes of the netting. We must use all the larger pieces of the

coke to fill up the holes first. Perhaps this will provide enough work for one day. When we resume we must go over the work again as before, pushing small pieces of cement-covered coke into places that we are able to see through. Finally, with a trowel we go over the whole thing with a thicker mixture of sand and cement, finishing it off neatly. When we have done this properly, it ought to be impossible to see through the framework, but the entrance and any proposed aperture must be quite free from obstruction.

When our work has set, we shall have a solid and substantial cave. Its only objection may be that it is too white. As a rule, the weather soon alters the colour, but there is no reason why we should not apply a little brown paint to the walls in places, just to relieve the glaring whiteness. Then we ought to find our work satisfactory in appearance and practically weather-proof. Inside the cave we can fix up seats in any way we may think best.



1. The garden cave completed



2. The framework for the cave

## MAKING ANAGRAMS AS A PASTIME

MOST of us know that an anagram is a re-arrangement of the letters of a word or phrase to form a new word or phrase that has some sort of connection with the old. Literally the word anagram means "letters backwards," and originally an anagram was a word or phrase written backwards, as, for example, "evil," which is the anagram of live. But now the name anagram refers to a transposition of the letters in any order, so long as they form a new word or phrase.

### HOW TO MAKE ANAGRAMS

A great deal of amusement may be had in a quiet way at a party, or where a few friends have met together, by arranging an anagram game. So many words and phrases are selected and written on slips of paper, and these are then shuffled or shaken up in a hat, and the members of the party then take them in turn until all have an equal number of slips. Then so many minutes are allowed, and when time is called the competitors must stop, and each reads out his original words or sentences and then his anagrams.

Of course, a perfect anagram is when all the letters have been used up in making the new word or phrase, and no additional letters at all have been used. But if this cannot be done, as many letters as possible should be used.

Playing at anagrams is not merely an interesting and amusing way of spending an evening. It is a useful, intellectual exercise, and does much to help one in thinking, and in the use of words. It is a pastime that has not been despised by the greatest, and many well-known anagrams are on record that were made up by distinguished scholars and writers.

### SCRIPTURE ANAGRAMS

At one time, indeed, anagram-making was a serious study, and the Jewish Rabbis and the schoolmen of the Middle Ages believed that great truths could be discovered from the anagrams upon the words and phrases of Scripture.

A famous Latin anagram is upon Pilate's question: *Quid est veritas?*—What is truth? the letters of which rearranged give the sentence: *Est vir qui adest*—It is the man before you. To those who have never tried, it may seem a very simple work to make an anagram, but they should attempt one, and they would find it needs skill and patience. On the other hand, some may think that it would be nearly impossible to transpose a dozen letters to form a word or phrase. When we understand, however, that twelve letters can be arranged in no fewer than 729,000,000 different ways, we see that there are, in the re-arrangements, endless possibilities of forming new words.

### THE KIND OF WORDS TO CHOOSE

In selecting words for anagrams, it is well to take long words with several vowels in them, as these offer greater facilities for anagrams than short words with few vowels. The kind of words that are suitable are the

following: Revolution, which gives Love to ruin; Astronomers, from which we get Moon-starers; Crinoline, that gives Inner coil; French Revolution, that can be transposed into Violence run forth. Impatient gives Tim in a pet; from Radical reform we get Rare mad frolic! Old England can be turned into Golden land, and Paradise Lost into Reapsad toils. Surgeon is a short word, but from it we have the anagram Go, nurse! Telegraphs can be transposed into Great helps, and Universal Suffrage into Guess a fearful ruin—the *v* in this case being used for a *u*. Punishment will give Nine thumps, and Penitentiary, Nay, I repent it.

### ANAGRAMS FROM NAMES

For a variation, the names of the persons present or of well-known men may be selected, and anagrams made upon these. From Disraeli, for instance, can be obtained the anagram, I lead, sir! but those opposed to this statesman's policy made their anagram upon his name Idle airs.

After the result of the general election of 1880, a political opponent turned The Earl of Beaconsfield into Self-fooled, can he bear it? Charles Dickens gives Cheer sick lands, and Douglas Jerrold, Sure, a droll dog. Two good anagrams from Horatio Nelson are So! nation! I hero, and Honor est a Nilo—His honour is from the Nile. From Lord Palmerston we get So droll, pert man, and from Florence Nightingale, Flit on, cheering angel. Another good anagram on Florence Nightingale is Cling on, feeling heart. William Ewart Gladstone has provided several excellent anagrams, such as the following: A man to wield great wills; Go, administrate law well; G, a weird man we all list to; I'll waste no glad war-tune.

Or, for a further change, the names of places, or flowers, or birds, or, in fact, any class of words may be taken, and will provide equally interesting amusement and similar scope for ingenuity to the company present.

### WORDS FOR ANAGRAMS

Here are some single words from which good anagrams can be made: Catalogues, Christ's city, Crocodile, Lawyers, Melodrama, Midshipman, Parishioners, Presbyterian, Soldiers.

The following words have the article before them, and thus, of course, must be used in the anagram: The calceolaria, The nightingale, The turtle dove. Here are two phrases for making into anagrams: Is pity love? Poor house.

The following names of well-known people also provide good scope for anagrams: John Abernethy, Thomas Carlyle, Charles James Stuart, Henry Wadsworth Longfellow, Alfred Tennyson—Poet Laureate, Sir Robert Peel, William Shakespeare, Robert Southey, George Thompson. In case any of us find difficulty in forming anagrams from these words and phrases, the solutions to all of them are given on page 5114.

THE NEXT THINGS TO MAKE AND THINGS TO DO ARE ON PAGE 5101



## SOME FOREIGN MONUMENTS

IF we have never seen Stonehenge, we have all heard of it; but do we know why it was built, and by whom? Do we know the histories of Cleopatra's Needles, one of them now in New York, and one in London; or of the Nelson Column in Trafalgar Square, the arch of Decimus Burton at Hyde Park Corner, or the Albert Memorial in Kensington Gardens? Most of us know what these monuments are like from hearing about them and seeing photographs of them; many have passed them and seen them often; but not every one of us knows their histories or knows whether they are really beautiful.

Let us begin with Stonehenge, of which a picture appears on this page, for it is one of the oldest monuments in the British Isles. The name is taken from the Saxon words *stan*, stone, and *heng*, to hang or support. It is situated on Salisbury Plain, and consists of a double circle of upright stones—an outer and an inner circle. Every pair of these stones originally supported a stone slab, so that the whole structure looked like a double ring of gateways.

The outer ring had thirty upright stones; the inner circle contained about the same number, but of a smaller size. Inside this is an oval formed of ten stones from 16 to 22 feet high, and a huge flat stone

CONTINUED FROM 4899



BURTON'S ARCH

marks the centre. The stones are believed to have been carried from Marlborough Downs, 16 miles distant, as there is no stone of the same kind nearer. Round about this ancient structure are many mounds containing very old British remains, and from this it is known that at one time an ancient village or town must have existed here. No one knows who built Stonehenge. Some say it is the work of the Romans; some say it is a memorial to 460 Britons murdered by Hengist, the Saxon; but most people believe it to be a temple set up by the Druids.

Cleopatra's Needle is a name which is very misleading, for Cleopatra had little to do with this monolith, or monument made of a single stone. It was made about 1,470 years before Christ, by order of King Thothmes III. of Egypt, and set up in front of a temple at Heliopolis.

Thirty-one years before Christ the Roman Emperor Augustus defeated Cleopatra, Queen of Egypt, in a naval battle, and about that time he removed the obelisk, or monument, from Heliopolis to Alexandria, where it stood until 1878.

It was sent to England in a ship specially built for it, but the ship sank, and only with great difficulty and after much delay was

this historic stone, 186 tons in weight, raised from the bottom of the sea and placed upon the Thames Embankment. The inscriptions on the stone, which is over 68 feet high, tell about the conquests of the Egyptian king.

**A FAMOUS MONUMENT IN LONDON THAT IS BAD IN EVERY WAY**

Of very different character is the Albert Memorial in Kensington Gardens, one of the most inartistic monuments in England. It was built from Sir Gilbert Scott's designs in 1878. Like the top of a church steeple planted on the ground, a huge Gothic canopy of coloured marbles, stones, and gilded metals enshrines Foley's colossal bronze statue of the Prince Consort. The statue itself is bad, because it is badly designed, heavy and unlikelike, and because it is gilded. Had it been left ungilded, the bronze would have softened the hard lines and made the unnecessary and bad details less noticeable.

As it is, the gilding is a blaze of ugliness that makes the bad shape of the statue more noticeable. At the corners of the steps which surround the monument are four groups of marble figures which represent four continents: Europe, by Macdowell; Asia, by Foley; Africa, by Theed; and America, by Bell. But the chief thing to remember about the Albert Memorial is that it is *bad*.

After seeing this it is a pleasure to look at the beautiful arch at the Hyde Park Corner end of Constitution Hill. This arch is by Decimus Burton. It is simple in design and beautiful in proportion—two most important things in art. There is nothing ugly about this arch—no crowd of detail and unnecessary decoration which would spoil it.

**THE GOOD POINTS AND THE BAD POINTS OF THE NELSON COLUMN**

Let us now examine the Nelson Column in Trafalgar Square. It was designed by Bailey, and consists of a huge Corinthian pillar, or column, copied from one in a Roman temple, supporting a statue of Lord Nelson. The column itself is beautiful, but the statue is not remarkable. The chief fault of the work is that the column is too high for the statue. On the square base are four reliefs representing Nelson's great naval victories; these reliefs are made of the bronze obtained by melting cannon taken from the French. The

column was erected in 1843, but the four colossal lions by Landseer, which are the most beautiful part of the monument, were not added till 1871. Their shape is very fine, and the modelling of the beasts is good, restful but full of energy, simple, and grand.

Perhaps the oldest, and certainly the largest, monuments in the world are the Pyramids of Egypt. There are many pyramids in Egypt and in other countries, but the three largest of the nine pyramids at Gizeh are so much more imposing than all the rest that they have become known as *The Pyramids*. Largest of all is the one built by Khufu, who lived nearly 4,000 years before Christ. It is the largest building in the world, and was originally over 480 feet high. Very near these pyramids is the great Sphinx, a monster lion with a human head of strangely fascinating and mysterious expression. Of the Pyramids and Sphinx we read on pages 4779 and 4786, so that we may pass them over here.

**THE GREAT GATE OF LIONS, THAT WAS THOUGHT TO BE THE WORK OF GIANTS**

Perhaps the oldest sculptured gateway in the world is the Gate of Lions at Mycene—now Argolis—in Greece, not far from Corinth. This gate is of great size, and on a flat stone above the gateway are carved two lions standing with their forelegs raised rather like our lion and unicorn on the royal arms. The gate was discovered by Dr. Schliemann in 1874. On account of the size of this gate, and other remains near it, it was supposed by the ancient Greeks that it was built by the Cyclops, a race of giants; and thus the gate is still known as an example of Cyclopean work.

Not very far from here is the Choric Monument of Lysicrates at Athens—a well-known small temple, or shrine, erected in honour of Bacchus by the *choregos*, or winner of the prize for music or acting at the Dionysian Festival. It was a custom in the days of the Greeks to have competitions in these arts between the different tribes.

On the top of this shrine was placed the tripod, or three-legged bronze bowl, which was given to the choregos as a prize. The very beautiful monument has a square, box-like base, upon which stands the main body of the shrine, which is round, and in shape something

like our round pillar-boxes, but made of beautiful marble. Upon the face of the round body are pillars, or columns, which support a decorated dome. The tops of the columns, or capitals, are of the Corinthian order—that is, the style used by the people of Corinth. They are the finest examples of that style.

Italy has a larger number of important monuments than any other country, but we shall only describe the ones that are best known, two of which are in Rome. The Trajan Column, a copy of which is at the Victoria and Albert Museum at Kensington, and an imitation of which is the Vendôme Column in Paris, is an enormous pillar decorated with carved figures that illustrate the victories of the Emperor Trajan, who ruled from the year 98 to 117. The column was erected by the architect Apollodorus in 114. The other great monument in Rome is the Arch of Titus, a magnificent example of Roman architecture.

Titus, Roman emperor from 79 to 81, led the Roman army in the war which ended with the destruction of Jerusalem in the year 70, and the arch was built in memory of this victory. It is the finest of all the triumphal arches of the Romans. To the days of Venetian power, when the merchant republic on the Adriatic ruled the seas, belongs the famous column supporting the Lion of St. Mark in the Piazzetta in Venice. It is a winged lion made of bronze, and it has a very long tail. Its forefeet are planted upon an open book, and though the head of the animal is very fierce and ugly, the appearance of it from below is graceful and pleasing. It is the work of the fifteenth century, but the sculptor who made it is not known.

As the Vendôme Column in Paris is an imitation of the Trajan Column in Rome, so the great Arc de Triomphe, also in

Paris, is an imitation of the Arch of Severus at Rome. It was built by the order of Napoleon I. to commemorate his victories of 1805 and 1806. The arch, which is 48 feet high, 63½ feet wide, and 21 feet thick, has three arcades decorated with Corinthian columns of red marble. The reliefs commemorate the achievements of the emperor and the army. On the top was originally the celebrated group of four horses that now rests above the entrance to

St. Marks in Venice, but since the horses were sent back to Venice another group has been placed above the Arc de Triomphe in Paris.

What is it that makes a monument "good" or "bad"? People seem to think that anything is good because *they* like it. But this is not so. During the last three hundred years, we must remember, art has got worse and worse, and the very worst period of all was reached about the middle of Queen Victoria's reign. We have now begun to improve. So all around us we find that most of the buildings and monuments are very bad because most of them were made during the very worst period of art. From about 1750, artists did their best to startle people by carving a figure in a manner that they hoped would astonish. The sculptor carved every hair on his statue's head, and made all his work as close

an imitation of live creatures as he could. The architect made buildings with turrets and knobs, and thought because he smothered his building with ornamentation that he did good work. A good piece of work must *not* be an imitation of Nature, but a poetic rendering of it. A monument to be good must be *suitable* to its object and to its position. It must have good proportions. Detail and decoration must be subdued, or they will interfere with the principal lines and shapes.

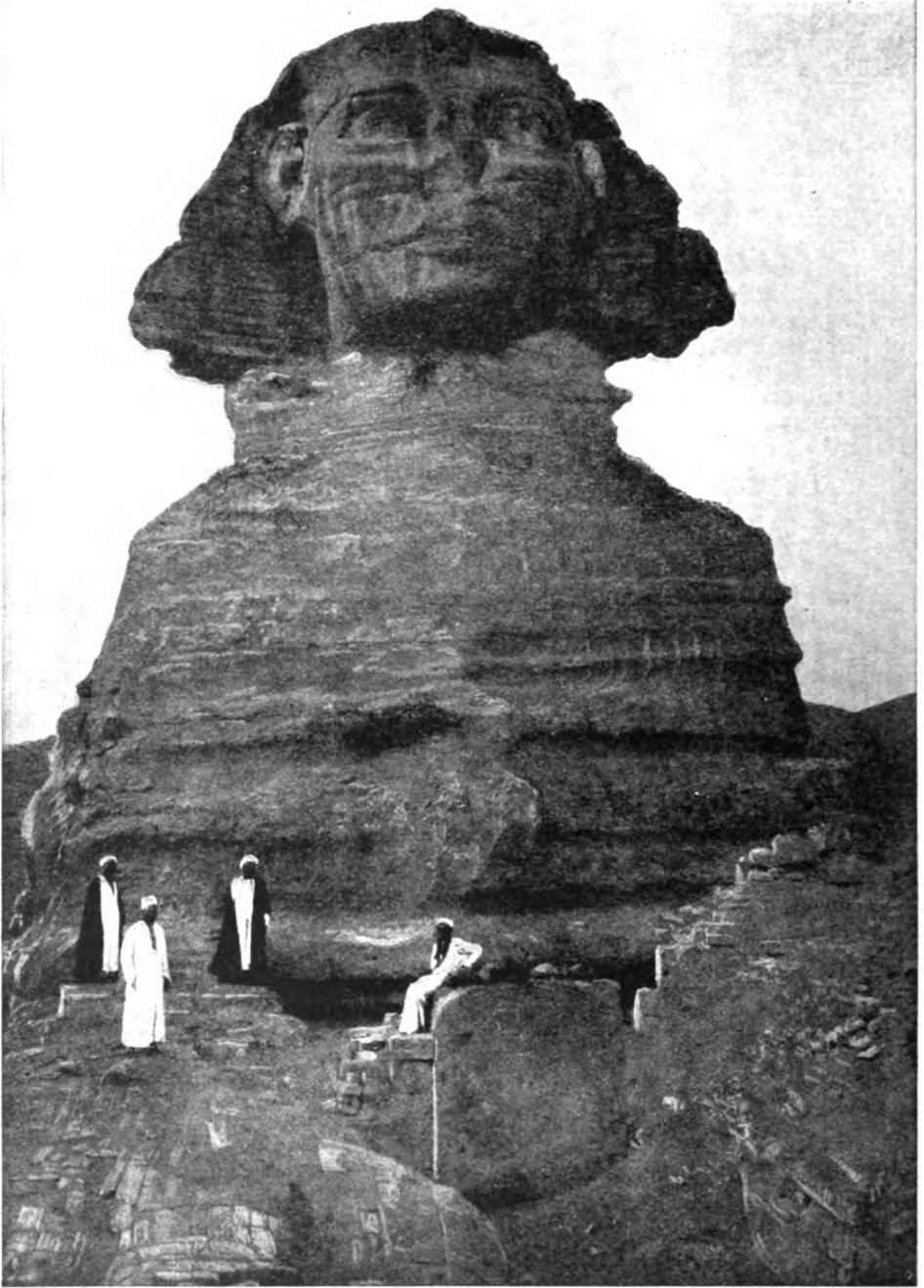
The next Familiar Things are on page 503.



This fine Gothic tomb, surmounted by an equestrian statue, was erected in the fourteenth century in memory of a Lord of Verona who died in 1329. Its strong and severe design reflects the feudal age.

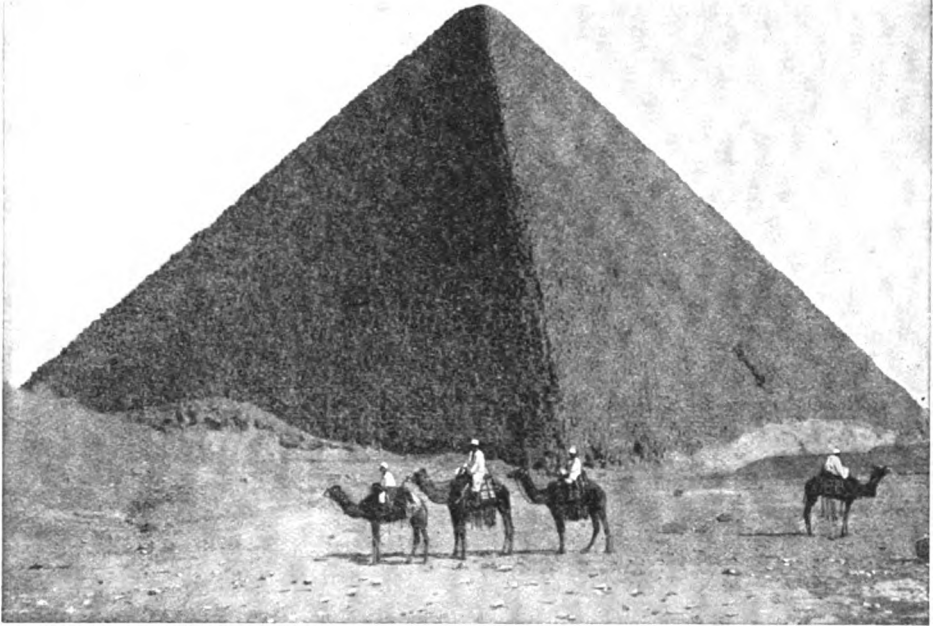


## THE OLDEST STATUE IN THE WORLD



The great Sphinx at Gizeh, in Egypt, is carved wholly from a mass of solid, natural rock, with the exception of the forepaws, which are built up with blocks of stone. Its date is unknown, but it is probably the oldest statue in the world, and certainly it is the biggest single sculptured figure on earth. It measures over 100 feet long. It is crude and massive, and without detail of any sort. It is very impressive and awe-inspiring on account of its stupendous size and its strong outline. The Arabs call the Sphinx the Father of Terror.

# THE MIGHTY MONUMENTS OF EGYPT



The Great Pyramid of Cheops, or Chufu, is a masterpiece of architecture and building. Designed to last for ever and protect the remains of the king, it is built with a masterful skill of masonry that is quite unsurpassed. The lining blocks of granite inside are fitted and smoothed so perfectly that it is impossible to insert the blade of a knife between them. Its shape is the shape most likely to endure through ages of time, and the 7,000 years that have passed away since this mighty monument was built have damaged the pyramid hardly at all.



The red granite statue of Rameses II. in the temple of Luxor, on the Nile, is a very beautiful example of Egyptian sculpture of about 1,270 years before Christ. It is carved in a simple and refined manner from one of the hardest stones known, and is wonderfully well preserved.



The pylon which stands before the temple of Karnak, built by Seti I. about 1,320 years before Christ, is rather like the triumphal arches which adorn the cities of Europe. It is beautiful because the proportions are good. The supporting piles are tall and tapering.

# ANCIENT AND MODERN MONUMENTS



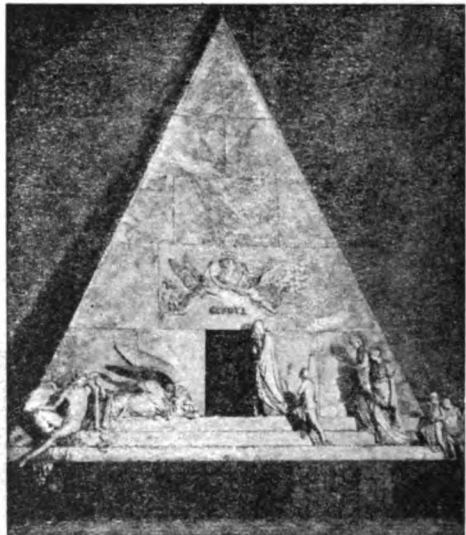
The Choragic Monument of Lysicrates at Athens, though small, is one of the finest examples of the Greek Corinthian style, or order. The proportion which the columns bear to the entablature that rests upon them is very beautiful; the pillars are of a size and height that go exquisitely with the round top and roof



The Lion of St. Mark is supported upon a tall and slender column splaying, or spreading out, at the top, the capital and the cornice above making a continuous line curving outwards. The winged lion is pleasant only in general outline. Its legs are planted wide apart, and the tail trailing behind gives the feeling of security.

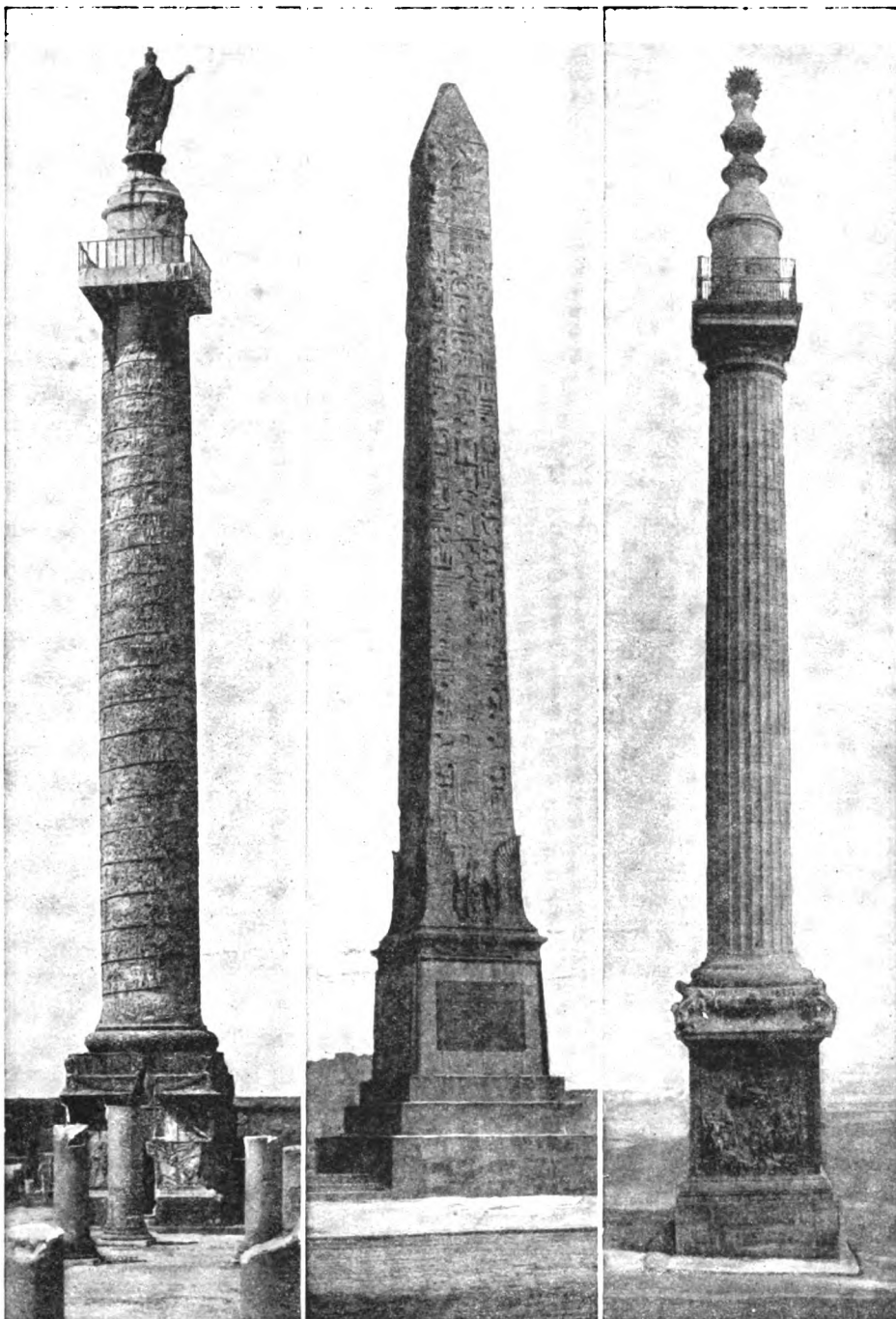


The two lions over the gate at Mycenae, filling perfectly, with the pillar between them, a nicely proportioned triangle, form a design that could not well be improved. The straight lines and big shapes give an effect of strength that is not only satisfying in itself, but is in entire keeping with the wall and gateway which it decorates. The masonry is rough hewn and huge, the lions are huge also, and, like the stones, strong in outline and square in the shapes of their trunks and limbs.



The tomb of Canova is just like Canova's own work; in fact, it was done by his pupils. It is hard in outline and bad, for instead of the figures being modelled like poetry, they are too natural—too full of detail. We do not speak like poetry. Poetry tells of real life, but in beautiful phrases. Sculpture should be the same: it should represent life, but it should be full of beautiful softness, and the figures here should be held more together in groups and shapes, like the words in poetry.

## THREE FAMOUS PILLARS OF STONE

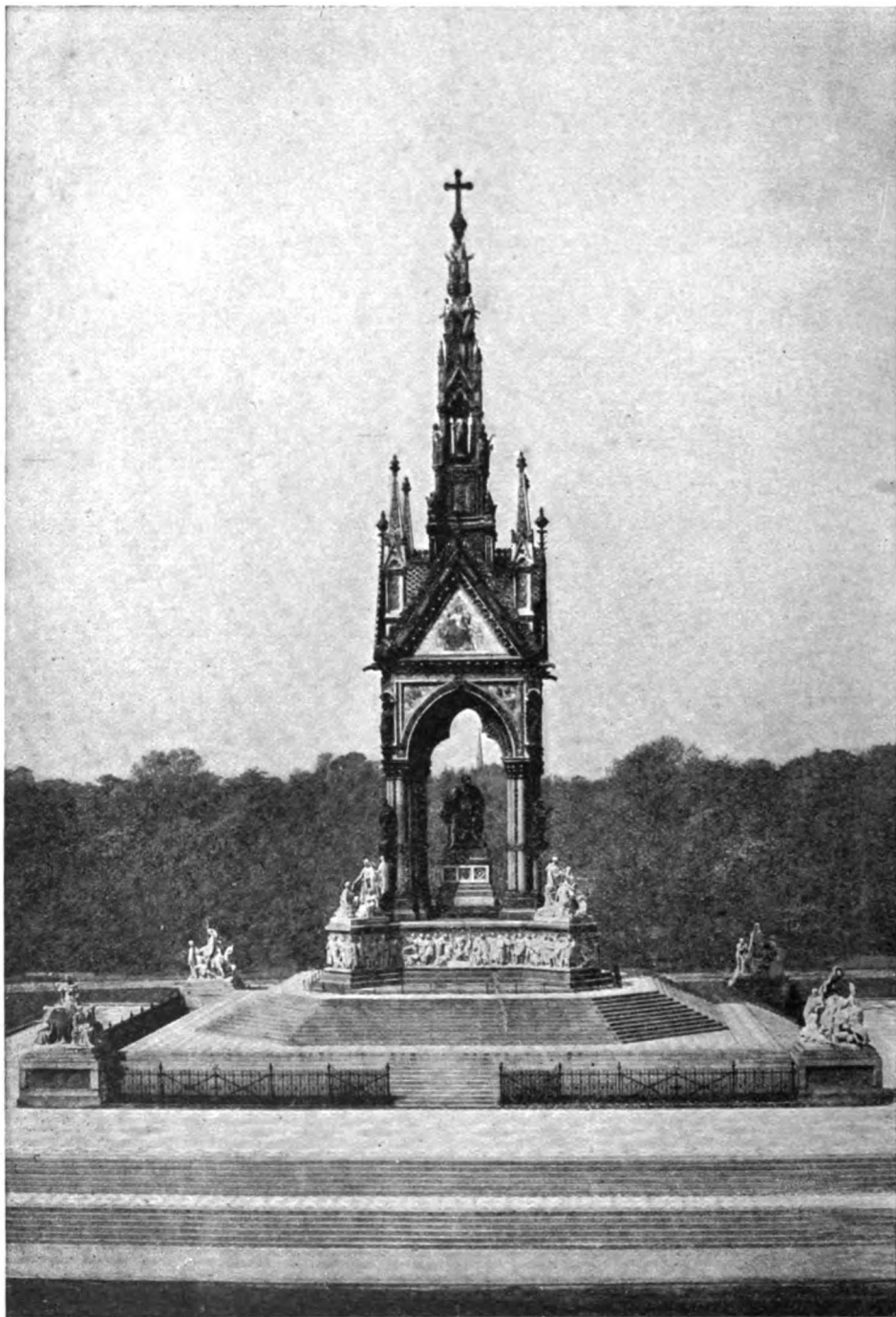


The general appearance of the Trajan Column is ordinary. The column, which was made to support a figure, would have been splendid for that purpose on account of its simple form, but the added balcony has ruined it.

Cleopatra's Needle is but a fragment of the original monolith. To a student of Egyptian art it is an interesting example of an Egyptian obelisk. It should have been placed simply upon a plain square stone.

The monument to the Fire of London is beautiful up as far as the cornice. The meaningless erection above is very bad. It would be better had the fire-ball been placed directly upon the cone just above the railing.

## ONE OF THE WORLD'S WORST MONUMENTS



The Albert Memorial is among the worst monuments in the world. It is bad because it is a mass of most intricate and gaudy detail. It looks spiky and hard. The mixture of all sorts of colours, stones, and metals is vulgar and florid. There is no simplicity, no strength, no shape, no unity in it. It is weak and ugly and extravagant. As a matter of fact, it is as ugly and rude as a woman who loads herself from head to foot with cheap jewellery. The photographs on these pages are by Messrs. Frith, Zaenghi, Anderson, Alinari, Neurdein, Brogi, Annan & Sons, Beato, Bonfils, the English Photographic Company, and the Art Reproduction Company.

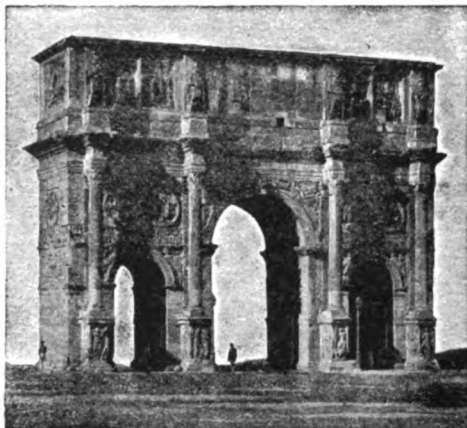


## HOW THE NELSON COLUMN IS SPOILT



The Nelson Column is a combination of different parts which are not suited to each other. The curious base is too large and quite unnecessary. The bronze panels are too large, and destroy the strength of the pedestal. Though, as an example of a Corinthian column, it is good, it is unsuited to support a figure, because the cornice naturally hides the figure. It would be better were the column plain, or fluted like the monument of the Great Fire. The figure itself is bad. The outline should show us exactly who and what the figure is and this it certainly does not do.

## THREE FAMOUS TRIUMPHAL ARCHES



This Arch of Constantine is the finest example in the world of a three-span arch. The proportions are exceedingly fine, but the elaboration just above the arches spoils it. It would have been better if, like the Arch of Titus, it had been simpler. The columns are slender and good. The shape of the whole is splendid.



The Arch of Titus is divided into pleasing shapes, big, simple, and strong at bottom; thinner sides that have less weight above; beautiful columns at the corners to support the cornice, which binds the whole together; and a perfectly plain top, which, by its plainness, gives more value to the little decoration.

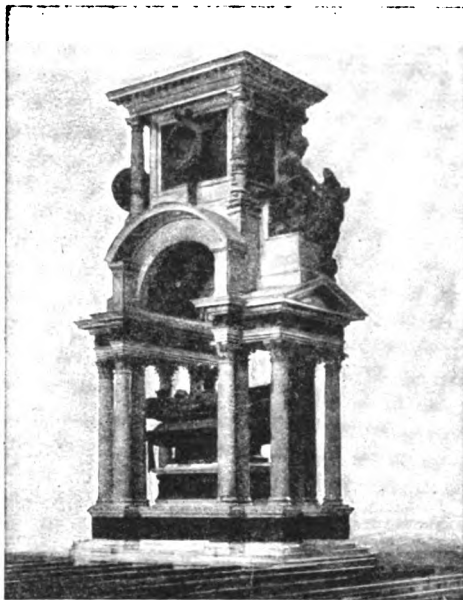


Compare this Arc de Triomphe in Paris with the Arch of Titus above. It is very bad. The sides are too thick and heavy. There is no thickening at the base, so it is weak. The moulding just below the sculptured groups is insignificant. The top is over-decorated, and so far too heavy. The frames of the sculptured panels are too big. The groups of sculpture are bad because they lack repose and strength. The whole arch is top-heavy.

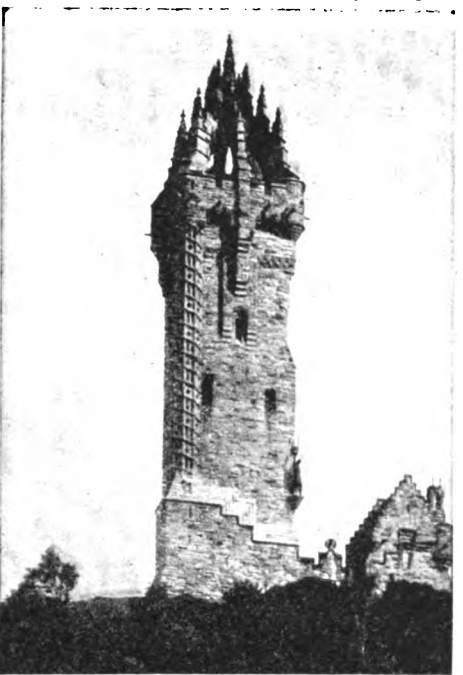
## FOUR OF THE BEST MONUMENTS IN BRITAIN



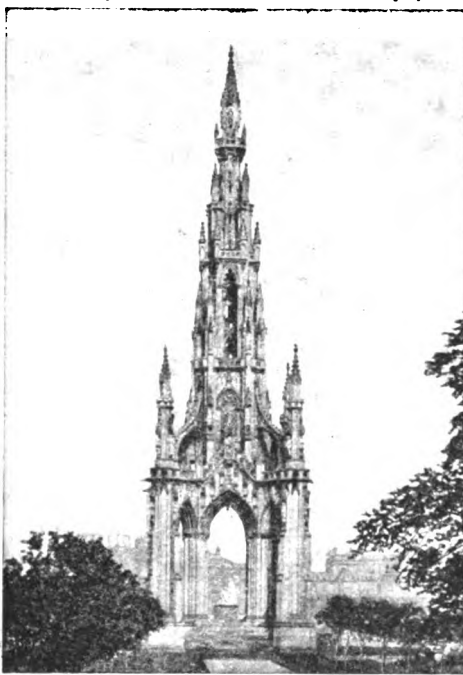
The statue of Charles I. near Charing Cross is perhaps the best monument in England. The pedestal is strong, with big, plain centre and sculpture small in proportion, unspoiled by mouldings or "frames," such as those on the Nelson Column; the horse and rider are simple and good.



The tomb of Wellington, in St. Paul's, is at least a monument of some simplicity and proportion. It is better than many others, although it is a trifle heavy. We should notice how very much better the sculptured figures look because the rest of the monument has been kept plain.



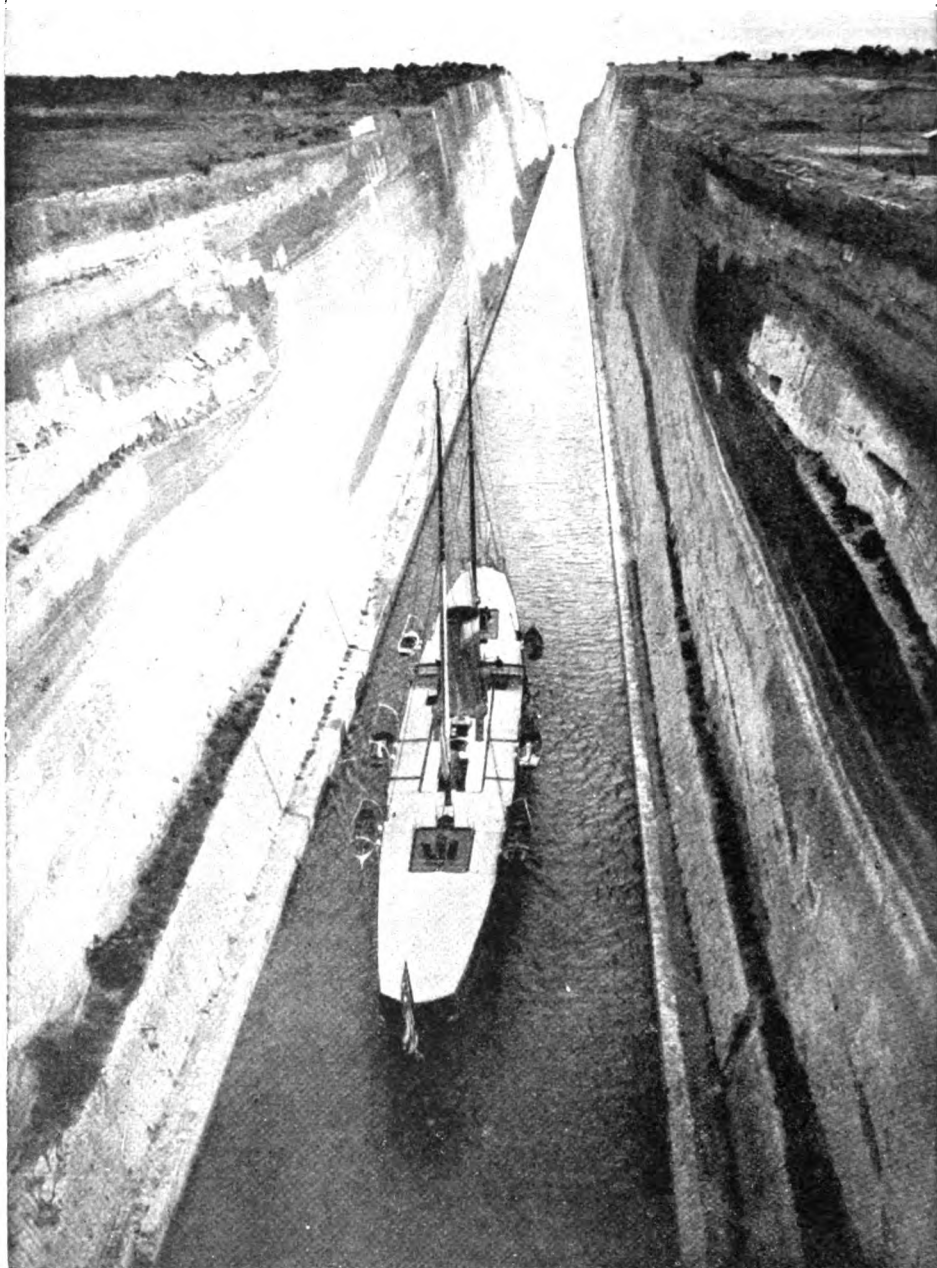
The Wallace Monument at Stirling is a weird mixture of florid French architecture and German invention. Its general form is not bad, but the pinnacles on top are shapeless and unnecessary. If we were to cut the top off at the battlements it would be stronger and better.



The Scott Monument in Edinburgh has some good details, but as a whole it is bad, for it is far too crowded with little fine details. When such a monument is smothered with elaborate ornament, as this is seen to be, it destroys the outline and bothers us with details.

THE NEXT PICTURES OF FAMILIAR THINGS ARE ON PAGE 5093

## THE CANAL THAT NERO DREAMED OF



This is one of the wonderful canals which help to shorten the journey round the world. It is the Corinth Canal, cut through the Isthmus of Corinth, and it enables ships to go to Athens and thence on through the blue Ægean Sea to Constantinople without having to sail round the rocky coast of Morea, in the south of Greece. When the Roman Emperor Nero was young and energetic, he caused this canal to be begun, but the work was put off and never resumed until our own time. It is 3½ miles long, and was cut through limestone rock in one part 250 feet above the level of the sea. The canal is 100 feet wide and 26 feet deep, and it saves ships 200 miles. Sailing through it from Greece, the traveller comes out in full view of the city where Paul made tents.

The photograph is copyright by Messrs. Underwood and Underwood, New York.



## WHY DOES A BALL BOUNCE?

THERE are two kinds of balls which bounce—those

which are solid, like a hard indiarubber ball or a golf-ball, and those which are hollow, like a tennis-ball, covered or uncovered. No matter whether a ball is solid or hollow, its bounce is due to the fact that it is what we call elastic. This simply means that when the ball is pressed out of its shape, it tends to return to the shape it had at first. It is this return to its original shape, or rebound, that makes the ball bounce.

We must not, however, think that only indiarubber is elastic. On the contrary, steel is much more elastic than indiarubber, and, as can easily be proved, steel balls bounce splendidly.

### WHAT MAKES A BALL STOP BOUNCING?

Into almost every question we can ask, there comes, sooner or later, the greatest and deepest law of all science, which is that nothing is lost or created, and that everything has to be paid for. This law of the persistence of power applies to the movement of an atom or a star, a butterfly or a ball.

When the ball starts bouncing, it has a certain amount of motion in it, which is force, or power, or energy. When it stops, that has gone. Either we must show that the energy has gone somewhere and has not been destroyed,

CONTINUED FROM 4828



or, according to the great law of the persistence of power, the

ball should bounce for ever. If it did not bounce for ever the law would be false. It is, however, quite easy to show that the ball does lose the power with

which it started. To begin with, it is moving, both up and down, through the air, and forcing millions of particles of air aside every moment. All the motion it gives to them it loses.

If a ball were bounced in a space as far as possible emptied of air, it would bounce far longer than it does in the atmosphere, just as a top will spin longer in the same circumstances. Suppose that, instead of bouncing the ball on something hard, we bounce it on a pillow or on loose sand. It will not bounce long in such a case. Its power has gone in moving the pillow or the sand as well as the air. The ball itself, too, is not quite elastic, nor is the ground. If the ball and the ground were quite elastic, and there were no air to move, and the ball never turned and rubbed the ground in falling, it would go on bouncing for ever.

### WHY WILL NOT A BALL BOUNCE WHEN IT IS BURST?

In the case of a hollow ball, such as a tennis-ball, which has a splendid bounce, it is not by any means the indiarubber only that explains why



the ball is so elastic. The ball is filled with gas, or, rather, a mixture of several gases, which we call air. We can soon notice how much this ball bounces if we compare an ordinary soft india-rubber ball with another one which has a small hole punched in it.

So far as the india-rubber is concerned, the two balls are practically the same, but their bounce is very different—unless we happen to bounce the second ball just on the place where the hole is. If we do not do this, the air is expelled from the hole when the ball is bounced, and we find that it bounces very little, because the elasticity of the ball is so poor. But the other ball bounces exceedingly well, because, when it is bounced, the air in it is not squeezed through any hole, and thus gives the ball its elastic rebound.

**ARE THE KNOBS ON SEAWEED FILLED WITH AIR?**

What we call air is a mixture of various gases, and any gas may be called "air." For instance, when carbonic acid gas was found to come out of heated chalk it was called "fixed air"—the air, or gas, that had been fixed in the chalk. So we may, perhaps, give the name of air to that which we find filling the knobs on seaweed, and, like the air we know so well, it is certainly a mixture of gases, but it is not the same mixture as our atmosphere.

The question may be asked, How does this air get into the knobs of seaweed? A seaweed, like all other living things, must breathe. This means that it takes into itself, through its surface, some of the oxygen dissolved in the sea-water around it. It also produces carbonic acid gas within itself, just as we do, though the whole process goes on very slowly indeed in the seaweed, as compared with ourselves. From the facts that have been mentioned we should therefore expect to find that the mixture of gases in the knobs on the seaweed shows that it is obtained partly from outside and is partly produced from within.

We must remember, also, that a piece of dead or dying seaweed, in surroundings unnatural to it, and exposed to the air and the sun, will undergo changes, and several of the compounds that make up its body will yield gases that may contribute to the contents of the knobs.

**WHY DO OUR HEARTS BEAT SO MUCH WHEN WE ARE NERVOUS?**

The answer to this question depends on our knowledge of one of the most interesting facts in the body. The beat of the heart goes on in consequence of the orders of certain nerve-cells that lie inside the heart itself. The brain, therefore, may be asleep or attending to something else, or poisoned, yet the heart will go on beating.

But as the beat of the heart decides the flow of the blood, the brain, which is the great master and controller of the body, must have some control over the heart. Certain special nerves therefore run down from the brain, through the neck on each side, to the heart. One pair of these nerves has the power of making the heart beat slower and weaker, and the other has the power of making the beat quicker and stronger.

When we are frightened, the brain sends certain orders down through these nerves, which have the effect of making the heart beat strongly and quickly. When something occurs to terrify a creature, the best thing it can do, as a rule, is to run away. Now, we run with our hearts far more than with our legs, and the real secret of this beautiful working of the body is that the increased force and speed of the heart-beat, when we are frightened, is the body's attempt to make provision for running.

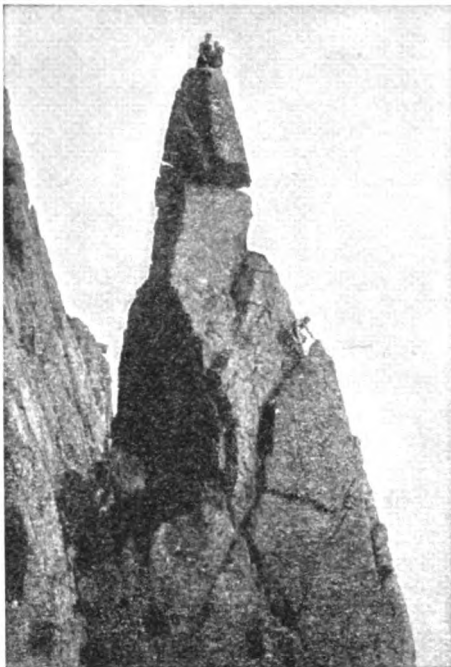
**WHY DO OUR HEARTS BEAT FASTER WHEN WE RUN?**

When we run we are doing work, for we are moving a certain amount of matter—our bodies—at a certain speed through space. The power we spend has to come from somewhere, and, indeed, what happens is that large quantities of sugar and other things are quickly burnt up in our muscles.

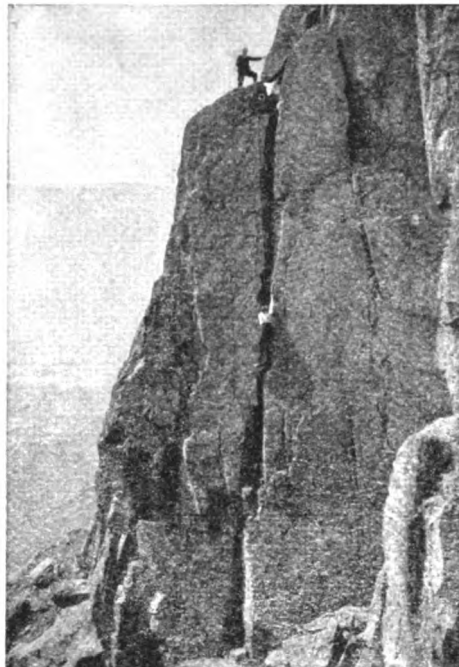
The result of their burning is the gas called carbonic acid, which is a poison to all animals and human beings. The blood becomes quickly filled with far more of this gas than usual, and means must be adopted to get rid of it quickly enough, or we should die of poisoning by this product of our own lives.

If we examine the air coming from the lungs of a man who is running or doing hard work with his muscles, we find that there is, perhaps, ten times as much carbonic acid in the breath

## SOME ENGLISH MOUNTAINS



Mountain climbers may find in England difficult and exciting adventures, for in the mountains of Cumberland there are many points, like the Needle shown here, which only experts can reach, and that at great risk.



This mountain, known as the Great Gable, has two of the most dangerous climbs in Britain. The split in the rock seen in the picture, called Kern Knotts Crack, is almost perpendicular, and climbers have to ascend inside.



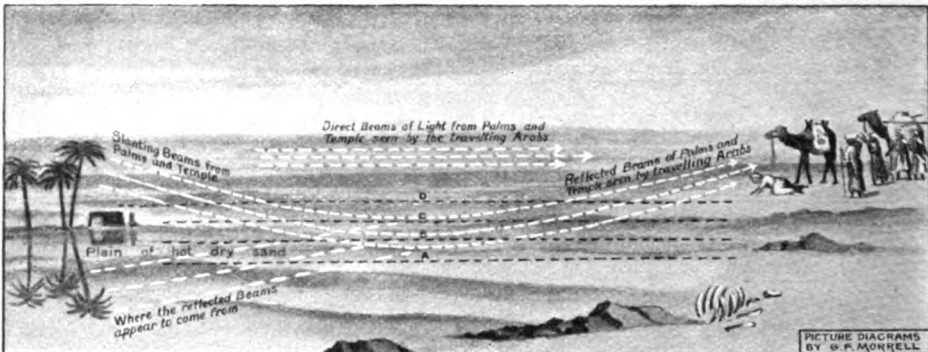
It does not follow that the highest of a group of mountains is the most difficult to climb. Scafell Pike is the highest peak in England, but other points are harder to reach. The view from Scafell, as seen in this photograph, is magnificent. We are looking down upon Skiddaw, and in the distance is Lake Derwentwater.

The photographs on this page are by G. P. Abraham, Keswick.

# SEEING WHAT IS NOT THERE



In this picture we see a mirage in the desert, a scene which does not really exist at all, but is actually a reflection. To the thirsty and weary travellers there appears to be water, which afterwards disappears.



This diagram explains the mirage. The layer of air, A, next to the hot sand, is very warm, and different layers of air above, B, C, and D, have different temperatures, and therefore different densities. Now, beams of light passing through gases of different densities are refracted, or bent, in varying degrees, and, as shown here, the trees, as well as being seen by direct beams, are seen also by the reflected beams as if reflected by water.



This picture shows a mirage at sea, where the conditions are the opposite of those in the desert, the colder and denser air being lowest. The light rays from the ship strike upon layers of different density in the upper air and are refracted downwards. When the densities vary much, several images will be seen, some of them inverted.

he breathes out as there is when he is at rest. It is quite evident that the first thing the body must do in such a case as this is to make the blood move as quickly as possible, both through the muscles and the lungs.

It must move quickly through the muscles, because they are using up a lot of oxygen, and because they are making a lot of carbonic acid. The quick supply of blood is making a quick supply of air, and the extra beating of the heart is really very like the beating, as it might be called, of a pair of bellows when we want to drive an exceptionally quick supply of air into a fire. Also the blood must pass quickly through the lungs so as to get a lot of oxygen and lose its excess of carbonic acid. Therefore, the heart beats quickly.

It has lately been found that when a man is "in training," as we say, he produces much less carbonic acid when he runs than when he is not trained; and his pulse is not so much quickened. Thus, being in good condition means, among other things, that the body learns to be more economical in its consumption of fuel than it used to be.

#### CAN WE TRAIN THE MEMORY?

The answer to this question depends upon what we mean by memory. What we call memory has really various different parts. There is, first of all, the fact that something sticks somewhere in the brain. Then there is the fact that when it is brought to our notice again we recognise it—that is to say, we remember that we have seen it before. And then there is the power of recalling and bringing it up into our minds at will. These three things are very often put together in our minds, and we simply call them memory, but they are not all the same thing.

All the evidence we can get seems to show that the mere power of holding on to a thing cannot be improved by any kind of training. As for the power of recognising, that depends on the amount of attention we gave in the first place. But the power of recalling things at will can be trained, because it depends upon the extent to which different things are connected in our minds. We are more likely to be able to bring up things, so to speak, from our memory if we have more ropes to hold them by. This is the only way of

training the memory that is worth anything; and learning by heart, though it may be necessary for other purposes, is of no use for the purpose of recalling. The real way to learn to remember is to think. The more a thing is thought about, and connected up, as it were, with other things in the mind, the more certainly and easily shall we remember that thing when we want to.

#### CAN WE TEACH OURSELVES TO THINK?

Different people vary very greatly by nature in their inclination to think. A small number of people, sometimes with not very good minds, but sometimes such that they become the great thinkers of the world, are almost bound to think most of their time, whether about big or little things. Some of them cannot stop thinking even when they want to sleep. It was the greatest difficulty for Herbert Spencer, for instance, to prevent himself from thinking, and he had to use all sorts of devices to make his mind stop working for a little.

Most of us have the opposite difficulty, because very often at school we merely have our memory crammed and are not taught to think at all. But it is possible to learn the good habit of thinking, just as one can learn bad habits. We ought to set ourselves to ask the reasons of things, and also to read the right kinds of books, which are those that simply compel us to think, whether we want to or not. The time will come when the real education of the mind is seen to be learning to think. That is the great use of *facts* in real education—that we may turn them into *faculty*, the power of thinking.

#### WHY CAN WE THINK OF ONLY ONE THING AT A TIME?

If we mean thinking in the strict sense of steadily and purposely reasoning from one thing to another, then it is quite true that we cannot think of more than one thing at a time. The reason of this is that such thinking requires all our attention, and the brain is so made that close attention means running nearly all its power in one direction.

If, however, we are not thinking very hard, it is quite possible for other things to be passing through the mind at the same time. On the other hand, we all know that when we are very deeply interested in something, and

give it all our attention, we may think so completely of the one thing alone that the particular part of our mind in the background which usually reminds us that we have something else to do may not be heard at all.

**CAN WE EVER STOP THINKING?**

As long as we are awake there is something going on in the mind which may or may not be thinking in the proper sense of the word, but which, if not thinking, is at any rate feeling and willing.

If we stop all thinking and feeling and willing, then we are no longer awake, but asleep. At least, that appears at first to be true. But when we carefully study what happens during sleep, we find reason to suppose that some parts of the brain are always more or less awake. So, if by thinking we mean simply being more or less awake, then the answer probably is that, from birth to death, this kind of thinking is, to a greater or less extent, going on all the time.

But the word thinking is best used to mean real thinking, putting two and two together, and really arguing from one thing to another, asking the why and wherefore, and trying to find out the answer. That is real thinking, and the difficulty for most people is not how to stop it, but how to begin it, and how to keep it going on when it is begun. We make a very great mistake if we suppose that all the time we are awake we are thinking in this sense of the word.

**WHY IS OUR RIGHT HAND STRONGER THAN OUR LEFT?**

It is quite certain that the difference in *strength* between our hands is not natural, in the sense of being a thing decided from our birth, but is the result of the different treatment that our two hands have received since.

Difference in *skill* is another matter, as we read on page 1989. There is a simple instrument, meant to be squeezed in the hand, which measures the strength of the grip of the two hands, and it shows that the right hand is considerably stronger in right-handed people and the left hand in left-handed people. So that we should really have added to our question the words "if we are right-handed." These differences between the hands do not exist if we use the two hands equally. Some

children are very carefully looked after, to see that they become what is called *ambidextrous*, using both hands alike, and their hands are equally strong.

We see, then, that it makes a great deal of difference to our muscles how much they are exercised. There is no doubt that the difference in the strength of the two hands depends on the size of the muscles, for a tape measure put round the two forearms, or even a pair of gloves put on, will often show the difference that use or exercise has made in the size of the hands.

It is true of every part and every power of our bodies that they can be improved by use. On the other hand, it is no less certain that, for every part and power of the body or the mind of everyone, there is a limit which, if we are wise and careful, we may reach, but beyond which we can never go.

**WHAT MAKES A ROUGH SEA CALM WHEN OIL IS POURED UPON IT?**

The explanation lies in one of the contrasts between oil and water, which we can readily observe for ourselves even when we have a small quantity of the two liquids in a couple of bottles. If we shake the bottle of oil, we notice how slow its movements are, and how difficult it is to make it splash. It is what we call a viscous liquid. Water moves much more easily, and we call it a mobile—that is, movable—liquid. Oil calms troubled waters because it is so viscous. But it is very difficult to understand what it is that makes one liquid viscous and another mobile. Partly it has something to do with the size of the molecules of the liquid. In the case of oil of any kind, the molecules are very large.

**CAN A FLY SEE ALL WAYS AT ONCE?**

A fly cannot see quite in all directions at once, because, whatever the shape of its eyes, one part of them, at any rate, must lie against the fly's head, and in that direction, at least, the fly cannot see. But it is true that the eyes of flies, and of many other insects, can see in far more directions at once than ours can. This is especially the case where the eyes are not flat, but very much rounded and bulging.

We must not suppose that this means clear vision at one and the same time in all these directions; but it does mean that, while looking in one direction,



so to speak, the insect can get a hint of movements much farther round the corner than we can. The proper way of saying this is that their field of vision is very large, even though it does not quite amount to seeing "all ways at once."

In order that the eye shall be able to receive light coming from so many different directions, it is made somewhat like a precious stone that has been cut into many little faces, or facets. The number of these tiny, flat facets on the eyes of insects is extraordinary. A male ant, for instance, may have 1,200 facets on each eye, and the number on the eye of the dragon-fly has been reckoned as high as 17,000.

#### CAN FLIES HEAR?

The more we study the senses of different animals, the more do we learn that the sense of hearing ranks high in the scale, and comes late in the history of the progress of life; and thus we find that various creatures, whose powers of touch and of smell and of vision are marvellous, seem to be almost, or entirely, deaf. There are a few insects which can hear, but the greater number, including flies, cannot hear at all. Every imaginable kind of sound has been tried, and insects, with the exception of very few, take no notice whatever. Lord Avebury thought that perhaps insects might respond to sounds of so high a pitch that our ears cannot hear them, but he could not get them to take any notice.

The highest string of a violin has been scraped an inch away from bees engaged in pillaging flowers, and they have taken no notice whatever. The senses of insects, including flies, are so wonderful, and in some respects so superior to our own, that it is immensely interesting to find that nearly all insects, including not only the flies but the highest insects, such as the bees, the ants, and the wasps, are perfectly deaf.

#### WHY DOES THE POISON INSIDE THE WASP'S BODY NOT HURT IT?

This question would be interesting enough if it applied only to wasps, but it is really far more interesting, as we can ask just the same question about a vast number of animals and plants that contain substances poisonous to creatures of other kinds, but not to themselves. For instance, why should

a poisonous serpent, biting itself or another serpent of the same kind, do no harm, except just the harm caused by its teeth?

We are gradually coming to realise that the answer is to be found somewhere in the chemistry of life. The fact that different creatures differ from one another must mean, among other things, that each kind of creature has a chemistry peculiar to itself. That, of course, is the real explanation of the fact that one man's meat is another man's poison, that the wasp's poison is not poison to the wasp, nor the snake's poison to the snake.

Each kind of creature, then, has its own special chemistry. For the purposes of its own life it produces certain substances, useful as means of offence or defence. But it is in the very nature of the case that no kind of living thing could produce and retain substances poisonous to itself and continue to exist.

#### WHY DOES THE TRUMPET ON A PHONOGRAPH MAKE THE SOUND LOUDER?

We may ask this same question in many forms. For instance, why does a sounding-board over a pulpit make the preacher's voice louder? Why does opening the lid of a grand piano make the sound louder, especially on the side that the open lid is facing? Why does a singer's voice sound louder when he keeps his tongue low in the floor of his mouth?

In all these cases we see the same principle at work, and similar instances might be quoted from the case of light, as when we place a concave mirror behind the light in a magic-lantern, or have a complicated arrangement of mirrors behind the lamp of a lighthouse.

What happens is that the sound—or the light—is reflected in the direction we wish. When a sound is made anywhere, the law is that the waves spread out equally in all directions at the same speed and with the same power. But sound can be reflected exactly like light, and if we desire it to be heard specially well at any point, we must arrange to reflect it towards that point. We cannot make the sound louder than it is, but we can get more of it to reach the place that we desire.

This applies equally well, whether the sound is coming or going. We may put a trumpet on the phonograph, or we

may use a speaking-trumpet for our own voices, if we want to speak at sea or to a large company in the open air. Or, on the other hand, we may put the trumpet in our ears, as deaf people do, where it acts in just the same way, reflecting towards the canal of the ear a certain amount of sound which would not otherwise have reached it. Our own ears act as reflectors of this kind in a smaller degree.

The making of echoes by walls is really just the same as the action of a trumpet ; only when the wall is far away the reflected sound comes so long after the first sound that we hear two sounds. Walls help a speaker if they are close beside or behind him, but not otherwise.

**WHY WERE KINGS IN THE OLD DAYS SO CRUEL AND HARD?**

Kings are naturally very much like other people—that is to say, when a little boy is born to a king and queen, he may be likely to grow up kind-hearted or cruel-hearted, or somewhere in between, just as other people may. And there certainly have been many kind-hearted kings, but there are various reasons why the records of history are full of the names of cruel kings.

For one thing, there is always more to say about cruelty and wickedness than there is about kindness and goodness. The newspapers of to-day give a very wrong idea of the proportions of good and evil in the world, and history books also tend to give a wrong idea in this respect.

Again, almost the only way in which, in times gone by, a king could keep his throne was by being merciless. Young kings who had any tenderness in them, and hesitated to kill their enemies, were soon killed or dethroned themselves. Where power extends to ruthlessness and cruelty, we shall not expect mercy and kindness long enthroned.

But now kings know that their only "divine right" is the divine right to be kingly men, which we all have, and that the old days are gone for ever.

**ARE NEW CLOUDS ALWAYS BEING MADE?**

Clouds are always being made and unmade. No cloud lasts for more than a short time, and the surface of a cloud all round is constantly changing. The making and unmaking of clouds depend, from moment to moment, upon a great many different conditions in the air ;

for instance, the temperature of the air, the amount of moisture it contains, the nature and temperature of winds, the amount of dust in the air, and the state of the electricity in the air at the time.

These things are changing from moment to moment ; indeed, it is not possible that they can all remain the same for two moments together. The earth never ceases to spin, and this means that different parts of the air are being brought under the rays of the sun or out of them. Even though the sun is shining on parts of the air for many hours at a time, the spinning of the earth makes it shine at a different angle, which alters the force of its rays. As the sun shines it warms the air, and so increases the amount of water which it can hold in the form of transparent water-vapour rather than in the form of clouds.

So clouds are always being made and melted here and there, as no one needs telling who has been able to spare time to watch the face of the sky steadily and carefully for even a short period.

**WHY WILL NOT WATER BURN AS OIL DOES?**

There are some oils and some spirits, which have the appearance of water to the eye, that burn. So we can understand that it was a great puzzle for many centuries why one fluid should put out a lighted match applied to it, and another should promptly burst into flame.

We now know the answer perfectly, but less than a hundred and fifty years ago the united wisdom and knowledge of all mankind had no key to it. That was because men did not know what burning was, and until we understand the nature of combustion, or burning, of course we cannot explain the differences in various cases.

We now know that burning is the chemical union of some other elements with oxygen. The other elements are able to take up a certain amount of oxygen, and no more. When they have taken up all they can, they are completely burnt, and will not burn any more. Water will not burn because it is already burnt ; it is the result of burning hydrogen with oxygen. Oil and spirits burn because they contain a large quantity of atoms which can combine with oxygen, and have not yet done so. In all oils and spirits

these atoms are of only two kinds, atoms of carbon and atoms of hydrogen. But, as it happens, both of these are intensely fond of oxygen, and are therefore very good fuels. If we could carefully examine the gases which are given off from the lamp or the candle, we should find that they principally consist of carbonic acid and water in the form of a gas—the products of the burning of carbon and hydrogen.

**WHAT BECOMES OF THE OIL THAT IS BURNED IN LAMPS?**

Oil is usually a mixture of a large number of compounds, all of which contain a great deal of carbon and hydrogen. These are the principal elements in oil, though a certain amount of oxygen is often there too. Carbon and hydrogen are both able and willing to combine very readily and firmly with oxygen, and there is always far less oxygen already combined with them in the compounds that make up oil than they are able to combine with.

Every atom of carbon desires two of oxygen to form carbonic acid gas,  $\text{CO}_2$ , as chemists call it, and every two atoms of hydrogen desire one atom of oxygen to form water,  $\text{H}_2\text{O}$ . If the temperature is warm enough, and oxygen is present, the oil will therefore be oxidised, as we say, until all the carbon and hydrogen in it have combined with all the oxygen they require—in the proportions we have just noted.

The answer to the question, therefore, is that the oil disappears not because anything is destroyed, but because it is combined with the oxygen to form carbonic acid gas and water. At the temperature of the lamp both of these compounds can exist only in the gaseous form, and that is why it is difficult for us to realise that water is being made and poured into the air from a lamp, a candle, or a gas-jet all the time it is burning.

**IS IT TRUE THAT OIL STILL EXISTS AFTER IT HAS BEEN BURNED?**

It is most important for all our ideas of chemistry to be able to prove that all the carbon and hydrogen of the oil are contained in the products of its burning; and the proof that this is so, and that therefore not one atom of the oil is destroyed, though it all disappears, was one of the great discoveries in the history of knowledge made

at the end of the eighteenth century. We must weigh the oil, burn it in an enclosed place, collect all the water that is formed, gather all the carbonic acid by passing it through something that absorbs it, and then weigh them all together. We know how much oxygen is in a given weight of either of these substances, and, allowing for it, we can prove that all the stuff of the oil is still there, though it is so changed.

**WHAT IS THE SUN MADE OF?**

Not very many years have passed since it was said that this was a question to which no answer could be made. At that time no one had guessed the wonderful fact that, by holding up a prism to sunlight, and noting what the light looked like after it had come through the prism, we should be able to tell exactly and positively what chemical elements must be in the sun at the places where the light has come from.

Of course, it might be that when the light was studied in this way it gave us evidence of the presence in the sun of certain things quite different from the elements we know upon the earth. But the great and never-to-be-forgotten fact is that what we find is clear evidence that the sun is made of the same familiar elements that go to make up the earth and our own bodies—elements like carbon, oxygen, hydrogen, magnesium, calcium, and iron, besides many others.

**DO WE KNOW ANY KIND OF MATTER NOT FOUND ON THE EARTH?**

There is one element known to exist in sunlight which is unknown upon the earth. One of these was found in that outer part of the sun which is called the corona, or crown, and the name *coronium* was therefore given to this element. It has not been found anywhere on the earth.

Another element was found in the sun, and was called *helium*, after the Greek name for the sun, but in this case, some years later, this very element, first found in the sun, was found in a rare mineral on the earth; and now we know that it is also being constantly produced from the element radium. In the same way we are able to tell by the light of the stars what those distant bodies are made of, as shown on pages 2718 and 2719.

**WHY IS A RIVER ALWAYS MOVING?**

The water of a river, like everything else upon the surface of the earth, is always being pulled as near as possible to the centre of the earth by gravitation.

Even when a river or a stream is rushing fast downwards it still stays upon the surface; but we must remember that the new part of the surface that it reaches is nearer the earth's centre. When anything falls towards the centre of the earth it loses some energy which it had in it before it fell, and we must ask where the water got this energy from—the energy which, for instance, will turn a mill-wheel.

In other words, what raised the water in the first place, and never fails to raise more water? It is the sun. And so the answer to our question, "Why is a river always moving?" is really: "Because the sun is always shining." The sun's power raised from the sea the water that falls as rain, and makes rivers. Therefore it is really the sun that turns the mill-wheel, and it is also the sun that opposes us when we try to swim or row up-stream.

**WHAT KEEPS THE AIR ROUND THE EARTH?**

There is nothing whatever but gravitation to keep the air round the earth, and there are many things at work to make the air leave the earth. As the earth sweeps through space in its curved path, every part of it is always tending to move straight on instead of round the sun. And as the earth spins upon itself, the atoms of the air tend to be thrown off like the raindrops from a spinning umbrella. And if the movement of the atoms or molecules of gases in the air becomes quicker than a certain rate, they will fly off into space. There is almost certainly a leakage going on all the time, so that, in fact, the air is not being completely kept round the earth.

If the earth were smaller, it would not be able to hold round itself so dense an atmosphere as it does, and it would lose its atmosphere more quickly.

This is probably what has happened in the case of Mars, which is older than the earth and smaller, so that it has had more time for its air to leak away, and less power to keep it. So Mars has only a very thin atmosphere. And the moon, which is too small altogether, has now no atmosphere at all around it.

**WHY CANNOT WE SEE THE SPOKES OF A WHEEL WHEN IT GOES VERY FAST?**

The reason is that the marks made, so to speak, by anything upon the retina, or curtain, at the back of the eye do not instantly fade away, but last for a small fraction of a second. The real marvel here is that these images on the retina last for such a short time, and that it is so quickly ready to receive new ones. Still, the images do last for a little while, and if a wheel goes round at all quickly, the marks made by the spokes at the different parts of their journey run into each other, and we see no distinct spokes at all, but only a faint blur inside the circle of the wheel.

The first answer to this question that would naturally suggest itself to our minds is, that the spokes of the wheel cannot be seen when it turns quickly because they are moving too fast for the eye to catch. That, however, is not the case at all, and a simple experiment will show that the first explanation is the true one, and not this, likely though it sounds. If we set a wheel spinning in darkness, and then have a single flash of electric light just for an instant, we catch a glimpse of the spokes of the wheel all seeming fixed in one place, as if the wheel were not moving at all.

**WHAT WOULD HAPPEN IF THERE WERE NO FORGIVENESS IN THE WORLD?**

The greatest of all facts about men and women is that we are social beings. This is one of the deepest roots in our character. The person who desires to live entirely away from all his fellows, however good his motive, has in him something that is unnatural, unhealthy, and insane. All the facts of human life depend upon this fact that we are social; not merely that we enjoy each other's company, but that, as the Bible says, "no man liveth to himself."

But though this is true, the fact remains that each of us is still himself or herself, and no one else; and that our interests are often different from those of other people, and so offence must come in the world. If our offences, small and great, against each other were never forgiven, it might be possible, perhaps, to have some rude and simple kind of society—stern and cruel; but it would certainly be impossible for mankind to rise above that humble level.

The next Questions are on page 5163.



"THOUGHT," AS EXPRESSED BY THREE FAMOUS ARTISTS  
The first of these pictures is from Michael Angelo's statue of Lorenzo de Medici, the second is from a painting by Sir John Millais, and the third is from a statue by a great French sculptor, Auguste Rodin.

## HOW TO THINK

THE putting of things together in the mind, or association, as it is called, is the beginning of all the powers of which we are most proud; but though the usual name for it is the association of ideas, yet it does not apply only to ideas, but to everything that can enter the mind—a scent, a pain, a tone of voice, and thousands of other things that cannot be called ideas at all.

We know that there is a stage beyond seeing, and that is perceiving, and the proper name for a thing perceived is a percept, as we read on page 4939. Like everything else, except mere sensation itself, perception depends upon memory. The case of a puzzle picture, where we look for a long time and at last perceive a face, is a good instance of the difference between seeing and perceiving, and the same applies to hearing sounds and recognising them as a tune.

But these things that we perceive and make percepts are not ideas; they are simply a certain set of sensations put together and made into a whole. Perception is a great advance upon sensation, no doubt; but there is something better still, and the proper name for that

CONTINUED FROM 4944



is conception, or conceiving, as when we say, "I conceive that the stars must all be suns." That was the great idea, or conception, of Giordano Bruno, and it is evidently something beyond the mere perceiving, or recognising, that certain colours and shadows we see make a chair.

We have passed from the mere level of things looked at, or sounds heard, to the region of thinking. Here is an idea, or a *concept*—a thought. Two memories have been put together in the mind and connected, or held together, by it in a certain way. Previously there were in the mind the memories of certain percepts; first, the stars, and secondly, the sun. But the mind performed the great act of conceiving; it associated, or put together, the two percepts, the stars and the sun, and it made a new and different thing—the thought that the stars are suns.

For thousands of years men had not only seen the stars and the sun, but had perceived them, and had carried in their minds clear memories of the stars and the sun, so that they could recognise them when they saw them again. But not until the mind of Giordano Bruno said "The stars are suns and the sun is a star"



had anyone performed this great association of ideas, to use the old name. This instance we have chosen is a great one, but we perform little associations of ideas every day, whenever we think at all. A great instance has purposely been chosen, because what we are trying to understand is the building up of the mind, and such a case as this helps us to realise the orderly stages of the mind's wonderful ascent from the mere sensation of seeing up to one of the greatest ideas in the world. Let us just observe for ourselves how the stages follow upon one another.

#### **HOW A CHILD'S MIND IS GRADUALLY BUILT UP**

John Locke said that there is nothing in the mind except what was first in the senses, and that everything which comes to be in the mind is built up out of sensations and reflections upon them. Now, this is true, even in such a tremendous idea in astronomy as that the stars are suns. This begins with mere sensation. The mind begins its existence in babyhood and childhood without any inborn ideas of any kind. Its first experiences are mere sensations. The eye, as we know, is made from a part of the brain which has come forward outside the skull—"The brain comes out to see," as has been said. The eyes are turned upwards, and certain impressions of light are gained. These are mere sensations.

If there were no such thing as memory, they might be repeated every night during a lifetime, and nothing would come of it. But living matter remembers. So, beginning with sensation and with the necessary help of memory, we pass to the stage of perception where the points of light seen one night are more than seen, for they are perceived to be the same as the points of light that have been seen on former nights.

#### **REAL THINKING IS PUTTING THINGS TOGETHER IN THE MIND**

Percepts are remembered just as sensations are, and so we may go about with the percepts in our mind of the stars and the sun. Then one man singled out from the rest puts the two percepts together, and so makes a *concept* by this process of conception, or thought, and says the stars are suns. This teaches us the slow and necessary order in which the mind is built and

grows, and the dependence of its highest deeds upon its humblest deeds. It is also a good instance of the truth that all thinking is association of ideas. The word conceive means "to take together"; the word associate means "to make companions"; and all thinking is putting things together—making companions of them, making a relation between them.

To some extent we all do this without effort or intention, but beyond a certain point we are very apt not to trouble about it. The point where we stop the process is the point at which our interest ends. Thinking is not a thing that happens to us, but a thing that we do, and in all doing a motive power has to come from somewhere. The motive power in this great doing of the mind, which we call thinking, is interest. Here we come to the key of one of the great differences between men, and, if the study of the association of ideas taught us nothing else, it would still be well worth while to study for this.

#### **THE SECRET OF SUCCESS IN ALL GREAT THINKERS**

We are right to admire the "kings of thought," but we are very wrong in our notions of what makes them great. It is true that in certain departments there are very special powers which one brain has and another has not; this is true of mathematics, for instance, and of music. But, apart from that, there is nothing more certain than that most of the great thoughts, and most of the great discoveries of mankind, might have been thought or made by anyone if they had been interested enough.

The secret of most of the great deeds done by the minds of men, in the way of pure thought or association of ideas, has been the great difference, not in the way in which the great minds associate, but in the fact of interest and patience leading them to go on thinking and thinking, endlessly revolving the ideas in their minds, and at last finding out the truth.

For, of course, associations of ideas may be false or true, or they may be merely fanciful, not pretending to be true, as when we say the moon is made of green cheese. But the greatest business of the human mind in its power of association is the discovery of truth, and we ought to have a right notion in our heads of what we mean by truth.

We may think of our mind as a kind of mirror in which the outside world is reflected. Outside, then, there are things, and the reflection of things in our minds ought to correspond to the things as they are. Things outside and thoughts inside ought duly to reflect each other. Very often they do not. Our image of the outside world is distorted and twisted, or there are huge gaps. But, to some extent, our thoughts, the associations of our ideas, do genuinely correspond to the associations of things in the outside world; and then we can say that our thoughts are true.

**THE THINGS THAT MAKE A MAN A GREAT THINKER**

Anyone can associate any ideas; there is no difficulty about that. We may say the stars are night-lights, and a fancy like that may have some good in it as a fancy; but the great object of our minds is to make our thoughts genuinely correspond to things.

The great thinker is he who not only associates ideas, but makes the associations correspond to the associations in Nature herself. The virtue and value of the thought that the stars are suns is that that relation between the two in our minds is the relation between them in Nature herself. The reflection of things in the mirror of our minds, so to speak, is so far perfect.

If association is an act of the mind requiring power to do it, if it is vastly important, as it is, because right thinking goes a long way towards right doing, and if interest is the great motive which makes the mind think, then, certainly, it is our business to find out how far we can help and foster this interest in our minds, and also to find out whether one kind of interest differs greatly from another in its value for this purpose.

**HOW WE MAY HELP OURSELVES TO BECOME REAL THINKERS**

In the first place, it is certainly possible for us to foster interest in our own minds and in the minds of other people, and there are few more useful tasks than that of the people who go about trying to open other people's eyes, as we say, so that they shall see the interest of things and thereby start thinking about them.

There are false or doubtful kinds of interest, as well as good ones. A man may be interested simply in making

money, and the machinery of association in his mind will work, in consequence, with astonishing skill and rapidity; or a boy may be interested only in passing an examination, and so his machinery of association works hard for a time at something or other, and after the examination he seldom or never thinks of it again.

The blame is not his, but that of the system that makes a victim of him. Worst of all, perhaps, in its results, is the kind of interest which sets men studying things only in order to defeat someone else, or to prove that they are right, or to make a success for the party or the class or the church to which they belong against some other party or class, or church. This kind of interest is extremely powerful and very general, and, according to the universal laws of the mind, it produces its due result. Unfortunately, interest of this kind and interest in money are the driving power of most of the work of association, or thinking, that is done in the world.

**THE HARM OF LETTING OUR THINKING BE GUIDED BY WRONG INTERESTS**

If association done under interests of this kind resulted in the discovery of truth, that would be good; but, as a rule, it does not. Interest in the success of our party or our class or our religion, or of the people who have paid us to think and argue, destroys the true working of association of thinking in two distinct ways—both are disastrous. One of them is obvious, and the other is not.

The obvious one is that it is to our interest now to make the worse appear the better reason. We do not now make all the possible associations in our minds until we find the one which seems the truest, but we simply make the associations which best suit our case, and then we try to persuade other people that they are true. Things are so complicated that most men, if they think a little—and their interest sees to it that they do—can make the worse appear the better reason, and so associations are formed which are false. This may benefit the person or the class or the country or the party, but in the long run it must injure mankind. We must believe that truth is far more worth while than falsehood, or else we had better stop thinking at all. But there is the second less obvious way

in which the false kinds of interest lead men astray. In the last case men deliberately deceive other people, but in this case they unconsciously deceive themselves. This is because the whole process of association can be upset and changed by feeling. Long ago this was quite forgotten by men of science.

**THE WAY IN WHICH OUR FEELING AFFECTS OUR THINKING**

There was a time when men thought that the intelligence, or intellect—the part which knows and thinks—was practically the whole of the mind. They took no notice of feeling, and they thought that our deeds proceeded only from the results of what we thought. It is very strange how men could have thought this, for everyone knows how largely our feelings determine our deeds.

But to-day we do not make the mistake of supposing that the intellect is the whole of the mind, and so we are prepared to understand how much the intellect is affected by other parts of the mind. Thinking, or association, is a kind of doing, and we have just said that doing is largely determined by feeling. When we feel angry we are apt to kick, or hit, and so on.

Now, what is true of other more obvious kinds of doing is also true of that very wonderful, though less obvious, kind of doing which is called thinking. What we feel often decides what we think. We want to win, for money or for glory or for spite; we are fighting another country, and we want to prove that we are right; or we are fighting for our class or our church against people who dress rather differently, or who arrange the service rather differently in their places of worship. We fancy that we are seeking the truth, but we are not seeking the truth; and just for that reason we do not find it. We are driven by some interest which is not interest in truth, and that decides where we get to.

**THE WRONGFULNESS OF BELIEVING ONLY WHAT WE WANT TO BELIEVE**

This upsetting of the judgment by feeling, so that, as happens every day all over the world, men come to believe what they want to believe, is one of the most important facts in the life of mankind, and accounts for half the facts of human history. If we are at all sensible and watchful, we can soon notice for ourselves what

happens, because it is apt to happen to every one of us; and we need not wait long for a chance of observing it. What we shall find is probably this: that somehow or other all the facts and ideas and memories which suit what we want to believe, or to prove or persuade other people of, stand out strongly in the foreground of our minds. We know that the secret of attention is interest, and these things which we want to believe interest us most, and so we attend to them most.

Unfortunately, we attend to them so much that we do not attend to the other facts and ideas which do not suit our case. But we cannot form associations unless we attend, and so the associations which we do form, and the arguments which we use, are all based upon the things we have attended to, the things that interested us most, the things that suited our case. That is the reason why we often go wrong.

**THE REASONS WHY MEN DO NOT ALWAYS SEARCH FOR TRUTH**

We may be arguing with someone else who is interested to prove the opposite. Just as the points which favour us press up into our minds, so the points which favour his case press up into his. But really we do not listen to his arguments, and he does not listen to ours, and neither of us convinces the other.

This is the sort of thing that happens in politics, and most of the things men quarrel about. There is a certain amount of deliberate deception, but the great key to the differences of opinion which divide even intelligent men is self-deception, depending upon the way in which our processes of association are spoilt by our feelings and our interests.

This danger comes into everything, even into the discovery of truth. There are many reasons why it enters there also. It is not the discovery of truth, but trying to persuade people that we have discovered truth, that often leads to money or glory. Quite apart from that, when a man has said a thing, he likes to prove himself right, and that, of course, is not quite the same as liking to find the truth.

Then there are motives like jealousy, or motives like trying to prove that something which is believed by our church or our class or the particular school to which we belong is right. All

this only causes disaster. It means that a man, instead of looking at all the facts, looks only at some of them; it means that he sees the importance of facts that suit his case, and cannot see the importance of those which do not, and so he goes wrong.

But everywhere, in all ages, there are a few men who are real lovers of truth. They would rather give up their beliefs than believe what is untrue; they would rather believe the truth and be despised and hated than persuade men of something that is not true and be honoured.

**WHY A THINKER SHOULD BE INTERESTED ONLY IN SEEKING THE TRUTH**

The success which in some measure always attends these people, so that, if their brains are of a high order, they become the great thinkers of the world, like Newton or Darwin, depends absolutely upon the quality of the interest which drives them. We must have interest in order to make us think, or associate, but we must have the right kind of interest if we are to think rightly.

We can see, if we study the work of such a man as Darwin, exactly the way in which this interest in truth, and in truth only, keeps a thinker right. He is afraid of only one thing, and that is of going wrong. If his object were to prove anything in particular, he would be more interested in one set of facts than in another, but, as it is, he is equally interested in all facts, because all facts lead equally to the truth. They do not all lead equally to his theory, perhaps, but that does not really matter—it is so much the worse for his theory, and so much the better for the truth.

**THE MAN WHO TRIES TO FIND FACTS, AND THE MAN WHO TRIES TO PROVE A CASE**

Darwin began with a theory which came into his head, and then he spent twenty years working at it. People say that he spent twenty years trying to prove it, but that is simply not the case. If we study Darwin's mind, and the lines of the work he did, we shall agree that it is nearer the truth to say that he spent twenty years trying to disprove his theory. Indeed, he was trying to prove or disprove nothing, but simply to find the truth.

The success of the successful lawyer is, of course, entirely different. His business is to win his case. He therefore lays all the emphasis on the facts

which favour it, and purposely keeps in the background the facts which do not. He gets the verdict of the jury, but that is not the method to follow if we wish to gain the verdict of no jury, not even of all mankind, but the verdict of Nature herself.

Now we must conclude our study of association by observing how association comes into the higher acts of memory, which are those of recognising and, more especially, of recalling things. The highest kind of memory is the memory of a man like Darwin, who, when he looks at a yellow primrose, or whatever it may be, is able to recall in connection with that primrose a thousand facts of likeness and contrast which in some way or other relate the primrose to other things.

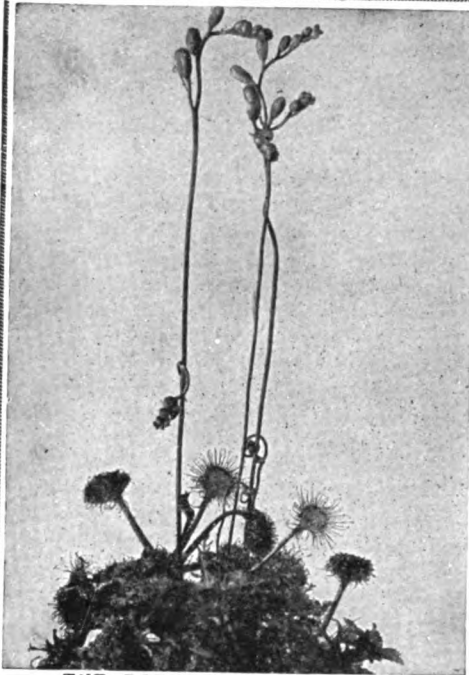
The point is not that the thousand facts are there—they might be there in anyone's mind. The point is that the primrose suggests them; the point, still more, is that, of all the facts in that man's mind, the primrose suggests just those which really do bear upon the primrose and help to make it understood. "Ah," he says, "I remember."

**A WISE MAN WHO KNOWS LITTLE, AND A FOOLISH MAN WHO KNOWS MUCH**

Then the man recalls some fact about some utterly different flower in some other part of the world which he has perhaps seen or has perhaps only read about; and the two facts taken together reveal a truth. The fact of the other flower may have been in another man's mind, but it did not occur to him, and there is the difference.

For all the uses of the mind, this kind of memory is the best possession in the world. It is of no use to store things in the mind if we cannot recall the right things when they are wanted. But people who have not studied the mind constantly make this mistake. A man may be a walking encyclopædia, and yet be very foolish. His mind is crammed with facts, but he cannot associate them rightly; they do not suggest each other to him in their true relations, and so they are simply useless. Another man may have only one-thousandth part of the knowledge, but a thousand times more wisdom, because the facts in his mind are properly sorted and arranged and connected and classified and compared, or, in a word, the facts are associated.

The next part of this is on page 5131.



**THE ROUND-LEAVED SUNDEW**

We see how this insect-eating plant is attracted to flesh by the pictures on page 3541. Wonderful powers used to be attributed to this plant. A fragment put into a glass of poison was supposed to smash the glass.



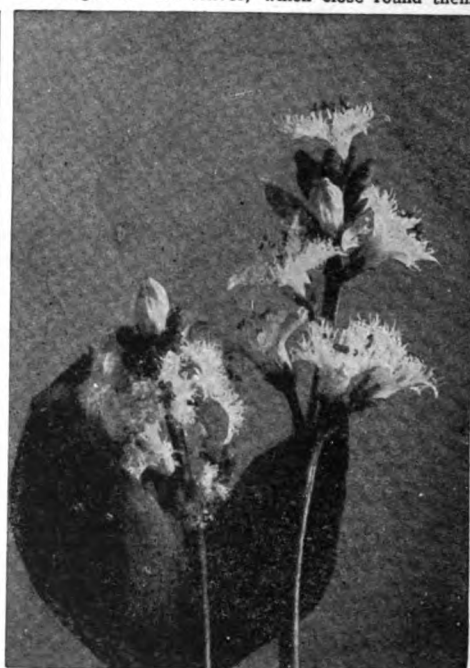
**THE COMMON BUTTERWORT**

This is another of our insect-eating plants. The leaves, with their frosted appearance, and the violet flowers give the plant a striking appearance. Insects are caught on the leaves, which close round them.



**THE BLACK COHOSH**

This tall plant of the woods was named cohosh by the red men, who were the first American botanists. They made a medicine from its root which was an antidote to the bite of the rattlesnake.



**THE BUCK BEAN**

The buck bean, which is also called the bog bean and the marsh trefoil, is one of the handsomest flowers of the bog-land. Its flowers are white, tipped with pink, and as many as twelve grow on one flower-spike.



## THE FLOWERS OF THE MARSHES

TO some extent the flowers of the bog and marsh are the same as those of the streamside. This, of course, is only what one would expect when it is considered that the reason for their existence in either place is their liking for abundant moisture at the roots.

Botanists call them *hydrophytes*, or water plants; while those of the downlands are mostly *xerophytes*, or dry plants; and those of the hedgerow, field, and wood are mainly *mesophytes*, or medium plants, because they like a soil that is neither wet nor dry. Therefore, when we are hunting for flowers around boggy land, we must not be surprised if we again meet with old friends of the streamside.

The soil of the bog is mainly peat, which is composed of the remains of plants that have grown on the spot. In most bogs we shall find a certain kind of moss, known as sphagnum, or bog moss, which grows in great quantities, the branches of each plant loosely interlocking with those of its neighbours, so that they become like a huge sponge, holding much water. If we pull up a handful of bog moss, and squeeze it, we shall get a clear idea of this. The bog moss grows to a great length, always fresh green at the top and

CONTINUED FROM 4970



dead at the bottom. The pressure of the new growths upon the old gradually turns the lower part into peat, which fills up the wet hollow where the bog began. The bog moss is not a flowering plant; but we may be interested in looking for its fruits, which are red and round, about the size of a small pea, standing on slender stalks above the plant.

Among the most curious of the bog plants are the sundews. As flowering plants they are not very striking, for their blossoms are small and white. In this case it is the leaves that awaken our interest and wonder. We have several kinds—as the oblong leaved, the spatulate-leaved, and the thread-leaved sundews. The round-leaved sundew has a small root-stock, and not much in the way of roots; but little more than is needed to hold it securely in the soil.

It has other means of getting its food, as we shall see. From the root-stock all around range a dozen or more leaves on long, hairy leaf-stalks. The leaf proper is half an inch across, while the leaf-stalk frequently measures an inch and a half long. The round leaf-blade is studded all over with long crimson glands, with a knob at the tip of each. From this knob there is poured out a clear, sticky fluid, which can be drawn out into long threads, as

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though it were a very good sort of liquid gum.

This gum, as we may call it, glitters in the sunshine, and, in combination with the red colour of the leaves, makes these appear more like flowers sprinkled with dewdrops. They also look not unlike small sea anemones, though it is not likely that they present such an appearance to the insects that visit them; but their action is much like that of an anemone.

Now, the sundew is so clever that it can tell the difference between things that will serve it as food and things that will not. If upon a fully open leaf we drop a particle of stone or glass, nothing will happen, which shows that the leaf has got some sense of taste or smell. But if we were to drop upon it the smallest fragment of meat, or even a snippet of hair, it will know that the substance is *animal*, and will bend its tentacles towards it, and envelop it.

#### THE HAIRY BONESET

The great, grayish, hairy boneset is a striking plant of wet places. Its deeply wrinkled foliage and great flowering tops, made up of tiny, dull white flowerets in little heads, were utilised by country folk as a favourite medicine, perhaps aiding the setting of bones by keeping the patient in good health. Its other name, "thoroughwort," refers to the way in which the tall stem appears to pierce the centre of a long, double-pointed leaf, — an appearance caused by the union of the bases of a pair of exactly opposite leaves.

#### THE BUCK BEAN, OR BOG BEAN

One of the most lovely of these little-known bog flowers is the buck bean, or bog bean. We shall know it at once if we remember its name, because its large leaves are broken up into three leaflets, and look like the leaves of the broad bean. These leaves come from a thick, creeping root-stock, from the middle of which rises a stout flower-stem bearing white or pink funnel-shaped flowers, the lobes of the corolla covered with fleshy fringes, and the stamens red. These should be sought in May or June.

#### THE MARSH MARIGOLD

If our visit to the bog is in spring, we shall find parts of it turned to gold by the rich yellow flowers of the marsh marigold. This is one of the buttercup family, as we shall soon see by the flowers. They are just huge buttercups, two inches across. There is a thick, creeping root-stock, that roots as it goes, and sends up thick stems and large, glossy, kidney-shaped leaves, that increase in size after flowering.

The flower has no petals, but the sepals are coloured and enlarged, and serve as well as petals. There are many golden stamens, and nectar is poured out abundantly at the base of the pistils, and attracts beetles, flies, and bees. Another name for the marsh marigold, given to it in many districts, is the kingcup.

#### THE MARSH VIOLET

About the same time we may find the marsh violet in flower. Its leaves are broader than those of the sweet and dog violets, more kidney-shaped than heart-shaped, and the lilac-coloured flowers stand high above the leaves on very erect stalks. They are not scented, and are sometimes white. The arrangements of the flower are much the same as in the case of the other violets.

#### THE BLACK SNAKE-ROOT

The black snakeroot, or black cohosh, shoots up in dark woods, as tall as a man. Its thick, knotted, fibrous roots are used in medicine. The leaves are made up of many small leaflets, and the tall flower-stalks are slender, pointed, and studded with delicate white tufts, which one may discover to be dusters of thread-like stamens, thrust out from flowers, whose sepals and petals are so small as to be hardly noticed, or have fallen away.

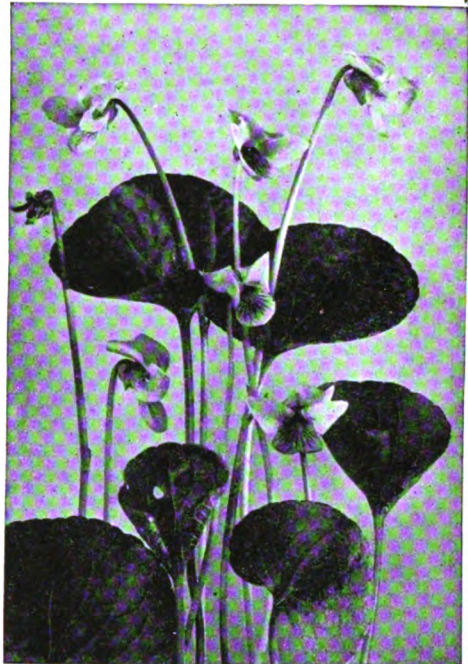
#### MEADOW - RUES

There is a group of herbs called meadow-rues, from a similarity in the delicate, fern-like foliage, made up of small leaflets, to that of the garden-rue. They bear great branching clusters of tassel-like little flowers, in which only the quivering groups of long stamens



**THE MARSH MARIGOLD**

In boggy and marshy places the marsh marigold, with its large, brilliant yellow flowers, is a very conspicuous plant. After flowering, the leaves increase in size. This plant, which is poisonous, is also called the kingcup.



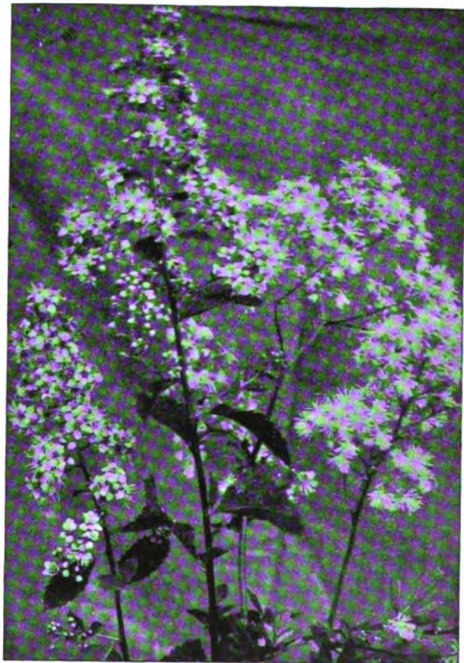
**THE MARSH VIOLET**

The flowers of the marsh violet, which grows principally in the North, are paler than those of the sweet violet, being lilac or white with purple veins. The leaves are firm and shining, and are almost round in shape.



**THE HAIRY BONESET**

The boneset or thoroughwort was a medicinal plant of high repute with our grandmothers, who could gather its blossoms and leaves in every field for their healing tea. It is also called thoroughwort.



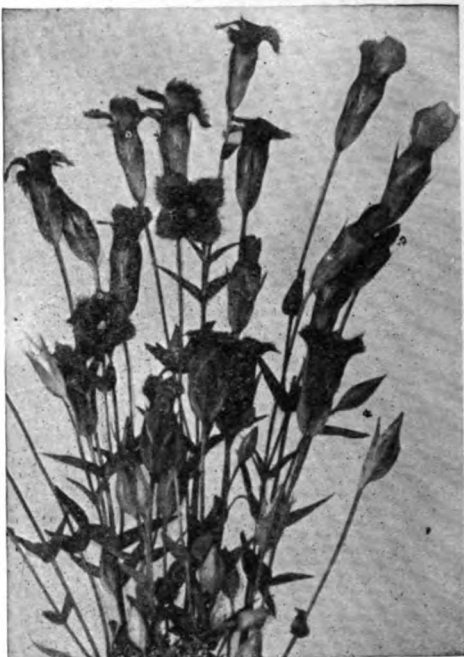
**THE SPIRAEA AND MEADOW-RUE**

The meadow-rue takes its name from its resemblance, in leaves, to the rue of our gardens. The meadow-sweet, or spiraea, is often found growing near the meadow-rue.



**THE CHOKEBERRY**

The chokeberry, a near relative of the meadow-sweet, is most often found on the edges of ponds and streams. Its berries are edible but dry and choking. It has tiny white flowers and small oval leaves.



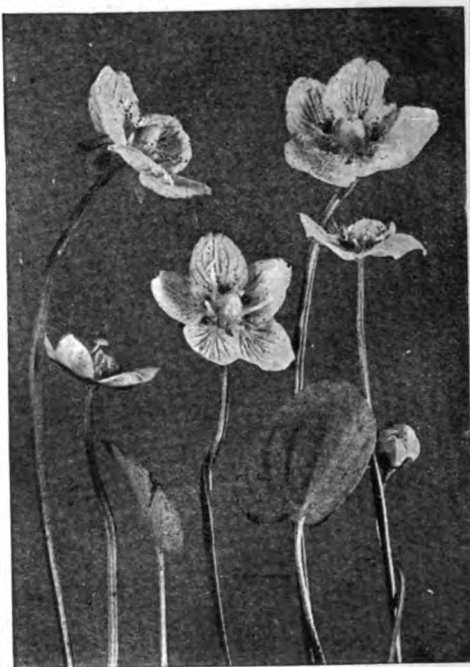
**THE FRINGED GENTIAN**

This gentian is perhaps the most interesting and beautiful of American autumn flowers, and must be looked for on rocky hillsides, where it grows in gorgeous purple patches.



**THE TURTLEHEAD**

The lovely white flowers of this plant look like the jaws of a turtle, and hence the name; and like its namesake, the plant is to be found in wet places. The edges of the marshes are often white with blossoms.



**THE GRASS OF PARNASSUS**

This beautiful plant is not a grass, but a member of the saxifrage family. The heart-shaped leaves grow on the end of long stalks, and the flowering stems have single white flowers beautifully veined.





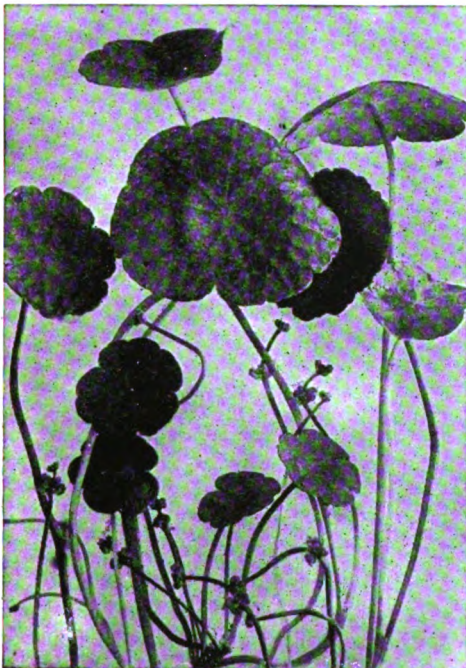
**THE BIRD'S-EYE PRIMROSE**

Certain bogland plants are found principally in the marshy lands of the northern United States and Canada. Among them is the bird's-eye primrose with foliage besprinkled with sulphur-like meal.



**THE MARSH CINQUEFOIL**

The marsh cinquefoil belongs to the rose family. It is a stout plant about a foot high, with large, dingy, purplish-brown flowers, and is common in European bogs. The edges of the leaves are deeply toothed.



**THE MARSH PENNYWORT**

This plant is also called the white-rot. Its round, smooth, shining leaves are the most conspicuous part of it, and the flowers, which are small, never rise above the leaves, and so must be searched for closely.



**THE WILD ANGELICA**

The flowers of the wild angelica, white tinged with pink, are a familiar sight in European swamps. The plant is tall, and makes a good yellow dye. The stalks are used for salads, and are sometimes candied with sugar.

are noticeable. One kind blooms early on rocky hillsides, while another, with snowy white flowers rears them high in meadow-lands, on very wet places.

#### THE SPIRÆA

Close by one will often find the delicate American meadow-sweet, or spiræa, quite a large bush, with slender branches bent down by the pointed, open clusters of bloom at their ends. The flowerets are flesh-tinted in the bud, growing paler as they open, and are like miniature apple blossoms. The bush may easily be transplanted to a damp spot in the garden, and will flourish wonderfully.

#### THE CHOKEBERRY

Another shrub, closely related to the spiræa, and with white, tiny, apple-like flowers, but arranged in flat clusters, is the chokeberry, that has small oval or obovate leaves, sharply saw-toothed on the edges. It grows knee or even waist high, and often stands in water. Late in summer the little bushes are loaded with red or nearly black berries, which the Indians occasionally ate, although the berries were so dry and tough that they were nearly choked.

#### THE TURTLEHEAD

The edges of a marsh often seem to have sheets of dull white laid over them, due to crowds of the quaint turtle-heads. The slender stems, bearing pairs of glossy leaves, are topped by thickly crowded, odd-shaped blossoms, quite plainly suggesting in their shape the pointed jaw of a turtle, and also resembling a snap-dragon, to which they are closely allied. But instead of being black and wrinkled, or brilliantly tinted, the floral turtle-heads are of the texture and bluish whiteness of china; only about the woolly mouths are the flowers faintly touched with rosy purple.

#### THE FRINGED GENTIAN

They bloom rather late, but perhaps the loveliest of all the autumnal flowers is the fringed gentian. One is not always certain to find them in the same place year after year, for they seem to change from one wet meadow to another, but they are worth hunting for, and often grow in large colonies. The whole plant is glossy with smooth, narrow

leaves, and the branches stand straight up and close together, bearing dozens of the bright blue blossoms. The buds are almost square, the four petals being twisted into a cone on top, but when they open in the sunshine, the lids of the box, as it were, flare widely, edged with most exquisite fringes. They are cautious flowers, and at the touch of night's cool fingers twist up their petals again, thus protecting the delicate stamens and pistil, at the bottom of the box, against frost. The sun, next day, causes them to open again, and they will do this several times before they wither away. The fringed gentian is very closely allied to the gentians of the Alps that bloom near the everlasting snows, and also to one of the curious plants of our swamps, the closed gentian, — another glossy plant, with closed blue flowers clustered about the stem — flowers that always look like buds, as there is only a tiny aperture at the top of the tubular blossom.

#### THE GRASS OF PARNASSUS

The grass of Parnassus is another beautiful bog flower, a member of the saxifrage family. Its leaves are oval, with pointed tip and heart-shaped base. They spring in a circle from the root-stock, and stand almost erect on long stalks.

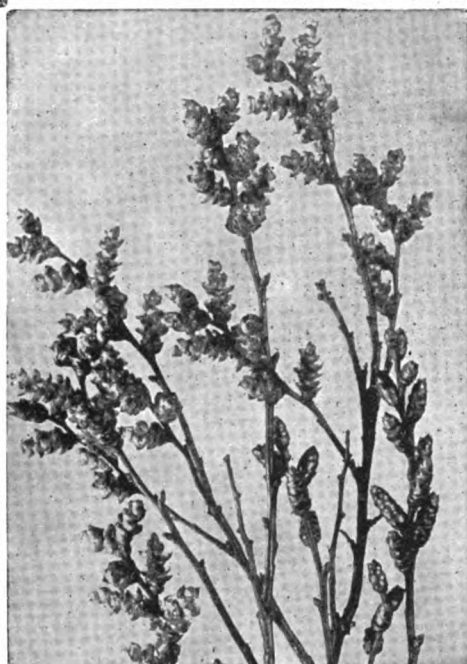
The flower-stem is much longer than the leaves, and bears one flower at its summit. This is about an inch across, the five white petals being of rather thick substance and finely streaked with green. The large pistil is in the centre of the flower, and around it are five stamens.

It is thought that there should be ten of these, and that the other five have been changed into oval scales which bear honey-glands near the pistil. From their edges grow a fringe of white hairs with yellow knobs, which shine as though they were wet.

#### LADIES' TRESSES

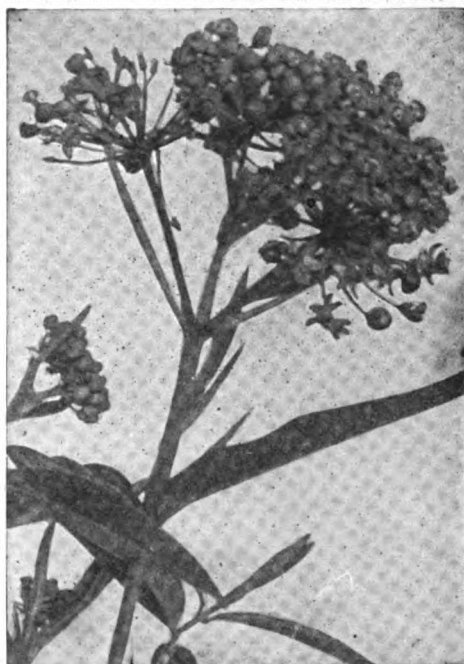
A swamp, especially a mossy cranberry bog, is just the place to look for many American orchids, but the ladies' tresses are generally content with damp meadows, or even dry pastures. There is one common variety, however, known





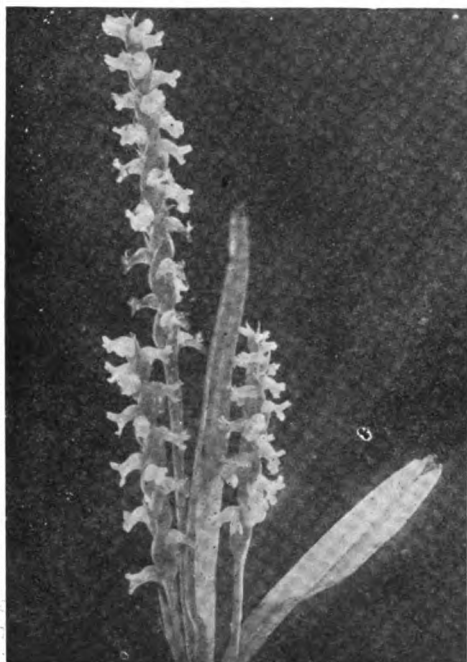
**THE BOG MYRTLE**

The sweet gale, or bog myrtle, is a bushy plant that flowers before it is in leaf. The bitter leaves were once used in place of hops. Clothes were formerly scented with the leaves, and beds stuffed with twigs.



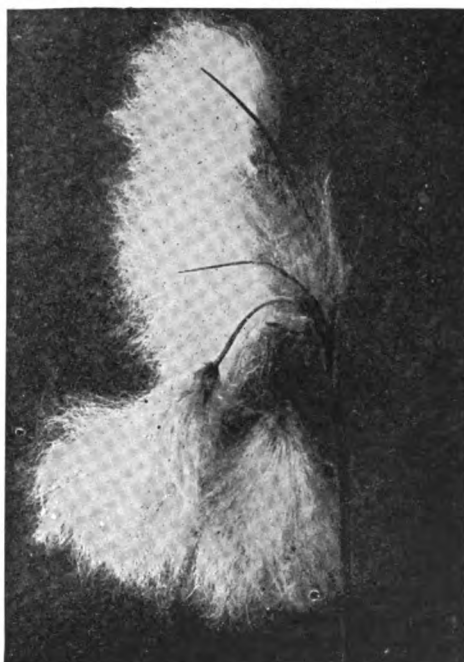
**THE SWAMP MILKWEED**

Among our many milkweeds, none is prettier than this with its drooping, tassel-like blossoms. It is a favourite food-plant of the milkweed butterfly. Its flowers are of a rose-pink and fragrant.



**THE LADIES' TRESSES**

This exquisite spire of blossoms, that seem braided together, holds its head above the green grass of meadows in late summer, and is almost the loveliest of American orchids. Its flowers appear frosted.



**THE COMMON COTTON GRASS**

In the boggy districts of the North, we often see what appears to be tufts of white cotton covering the ground. This is the cotton grass. Attempts made to spin it have failed, but it is used for stuffing pillows.



without much reason as the nodding ladies' tresses, which is found in very wet soil, in marshes, or even in running water. A form of it, blooming in October, is very tall and strong scented, and has cream-coloured buds. Its flowers have a frosted appearance and are so arranged that the spike of flowers looks square in outline.

**THE BIRD'S-EYE PRIMROSE**

In the swamps of British North America there is a pretty little primrose called the bird's-eye primrose, or mealy primrose, because its leaves are covered on the under sides with a white or pale yellow powder.

The whole plant looks much more like the garden auricula than the common primrose of the woods, for its lilac or pale purple flowers are clustered, like those of the cowslip, at the top of a short stalk, a few inches above the unwrinkled leaves. It flowers in June and July, and gets its name of bird's-eye from a patch of yellow which is found around the mouth of the corolla-tube.

**THE MARSH CINQUEFOIL**

A purple-flowered relation of the common silverweed and barren strawberry grows in bogs throughout the country, and is known as the marsh cinquefoil. It has a long, woody root, like the yellow-flowered cinquefoil of the meadow, and, like it also, has its leaves divided into five or seven leaflets.

But the marsh cinquefoil has its flowers of a very dark purple-brown colour—not only its petals, but the larger sepals. Some bracts below the sepals, and the tall flower-stems, are all of the same purple-brown colour, which makes the plant look very singular. It flowers in the months of June and July.

**THE MARSH PENNYWORT**

On the bog moss we shall find a number of round, dark green leaves from half an inch to two inches across, but with no stalk visible. If we pull one up, we shall see the reason for this. The stalk is there, but fixed in the middle of the leaf underneath. The plant is called the marsh pennywort.

There is a slender stem which creeps through the moss, and, as it is hidden from the light, it is white. In the summer-time we may find its tiny cluster of pinkish-green flowers. It is one of the umbel-bearing family, but it does not look as though it were related in the least degree to the cow-parsnip.

**THE ANGELICA**

Another umbel-bearer that we may find on the borders of the bog, as well as in damp places in woods, is the wild angelica, which we shall have no trouble at all in placing in its proper family.

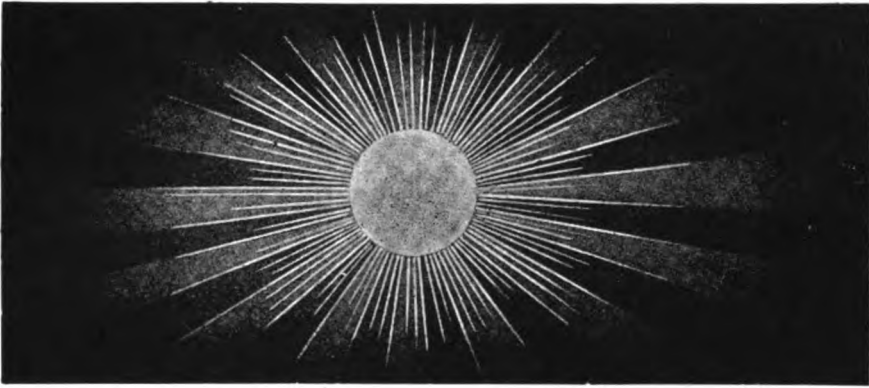
It grows to a height of five or six feet, with a thick, jointed, pipe-like stem, often of a purple tint. Its large, wedge-shaped leaves are often a couple of feet in length, much divided, as are the leaves of most plants of this family. The umbels of white or purplish flowers are very large, and appear in July.

**THE CRANBERRY**

In some parts of the country we shall find the cranberry, a relation of the bilberry and cowberry. The evergreen leaves and the flowers are very similar, but the stems creep, the flowers are red in colour, and the berries are dark red and extremely acid to the taste.

**THE SWAMP MILKWEED**

There are a number of Milkweeds, plants so called, as one can readily see, from the milk-white and very sticky juice that runs out of the leaves and stalks when bruised. They have small flowers, each of which is very unusual and curious in its appearance, gathered in umbels, as the clusters are called when the stalks all start from one spot, just as the ribs of an umbrella all spring from a tiny circle. Some of the umbels droop like great tassels, while others are stiffer and more upright. The swamp milkweed bears umbels of this latter kind, and is one of the prettiest of all. Its flowers are rose-pink and fragrant, and often float down the mountain streams when they fall. In its tough stems is a grayish fibre so strong, that its use like hemp, for ropes, etc., has been suggested.



## WHAT LIGHT IS MADE OF

WE read these words by means of something that is reflected from the paper to our eyes; and this something is found in all parts of the universe, and is the only means by which we learn about the greatness of the universe. It is called light. It is one of the many forms of power, or energy, and none is more important and interesting.

We know of light by means of our eyes. If we are blind, then, though there exists something in the outside world which would make light if we could see it, yet that something is not in itself light. This is rather puzzling, yet it is true. In order to have sound—that is to say, something heard—there must be ears. In order to have light—that is to say, something seen—there must be eyes; and if ears or eyes have limits to their power, they are apt to be deceived as to the world outside them.

There are forms of what we should call light, if we could see them, that are outside the limits of our seeing, though some of them can be seen by ants. We must clearly understand this, in the first place; and we must not confuse the study of the something outside us—which, when we see it, we call light—with the study of seeing, or vision. In the ordinary way, we use the word light only for what can be seen by us, and by using

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the word in this way we may forget some of the facts about light. But the light that we can see is not *all* the light, and it is now the custom of many writers on the subject not to use the word light, but rather to speak of *radiant energy*; for that term covers everything it ought to cover, whether we happen to see it or not. Here, however, we shall use the word light, and there will be no harm done, so long as we clearly understand that what is said applies not only to the light that we are able to see, but to radiant energy of exactly the same kind, but made of slower or more frequent waves, to which our eyes are blind. We know that one of these kinds of light that we cannot see we can feel as heat, and we know that it is called *radiant heat*.

Radiant heat is made of waves in the ether—that wonderful medium which is everywhere, and which, though we think we cannot see it, is yet really the cause of all our seeing, as light consists of waves in it. The laws of radiant heat and of light are therefore the same.

Though light has been studied for many ages, it is only within the last century or so that men have learnt enough to make them certain that it consists of waves in the ether, and not of something else; and we must learn that though the wave theory of

light is now known to be true, there was another theory which supposed that light consisted of a number of tiny specks of something flying through space.

We know for certain that light moves, and yet this is a thing which we may very naturally forget. Let us suppose that we are out in the open air on a bright day, or that we are in a room lit by a steady light; or take the simple case before us at the present moment and the place as we are reading this page. It seems to us that there is something which we call light illuminating this page, and which simply stays where it is. But this is not at all what really happens.

**THE LIGHT THAT FLASHES ACROSS A MILLION MILES IN SIX SECONDS**

All light everywhere is in movement, the most rapid movement in the universe. The light is pouring down from the sky, in at the window, or from the lamp, and up from the page to our eyes, as certainly as if it consisted of raindrops, but with vastly greater speed.

The first fact to learn is that there is something moving which makes light. This movement has been studied in various ways, and the rate of it has been found out. It is the same as the rate at which radiant heat, and also electric waves, move, for light is a kind of electric wave. This rate is about 186,000 miles in every second, or a million miles in less than six seconds. So far as we have been able to find out, this rate never changes; it is true for all kinds of light, and it is the highest speed that can exist in the universe.

Now, there are many kinds of movement, as we know, and this movement of light might be a movement of something that travelled from place to place, or it might be a wave movement which we could compare to the waves of water. When we throw a stone in a pond, the ripples run along the surface of the water, but it is not, of course, the surface of the water itself that runs.

**A SERIOUS MISTAKE THAT SIR ISAAC NEWTON MADE ABOUT LIGHT**

The greatest of all the students of light, since time began, was Sir Isaac Newton, the discoverer of the law of gravitation and of the laws of motion. But though this is true, and though if it had not been for Newton we could not know what we now do, it is an interesting fact in the history of knowledge that

Newton was wrong, and the mistake he made was most unfortunate. So far as he could judge, light did not consist of waves, but of tiny particles of something or other shooting through the air. In the study of such matters as these, there never was a mind quite so great, perhaps, as Newton's; and it is worth knowing that even the greatest of men may make mistakes, and when great men make mistakes, then the consequences are very serious. Newton had found out more about light than all who had gone before him, and this naturally lent his opinions great authority.

If light consisted, as Newton supposed, of a sort of rain or hail of tiny bullets flying through space in all directions at tremendous speeds, these little flying balls would push and press against anything they struck. Now, the latest of the great discoveries made about light is that it has a pressure. That is not to say, however, that it does consist of a rain of bullets after all, but that, though it consists of waves, and though no material thing is moving when light flies, yet these waves have a pressure.

**A FAMOUS MAN WHO COULD STUDY THINGS THAT WERE NOT YET DISCOVERED**

How interested Newton would have been to have learnt this! This pressure is true not only of light in the strict sense of the word—that is to say, the waves that we can see—but it is true of the other waves, rays or radiations that we cannot see; and the proper name for it is *radiation pressure*.

A famous Scotsman, named Clerk-Maxwell, declared, many years ago, that light must have a pressure, and stated how much that pressure must be. This he did by means of sheer thinking-power, and because he had a true understanding of the nature of light waves. Within the present century students have independently proved that light has a pressure, and the force of it is just what Clerk-Maxwell foretold.

When very careful and delicate experiments are made, and something that weighs very light is delicately hung by a slender thread made of quartz, so that the tiniest touch will push it, we find that it is pushed when a ray of light is allowed to hit it; and the force of the push can be measured, and proves to be exactly what it ought to be to agree with our theory of light

waves. It is very wonderful to see this experiment, and to see something pushed as if a finger or a jet of water had struck it, though we know that no *thing* has struck it, but only the motion of a force in the ether. We should remember the name of radiation pressure; for it is certain that every year we shall hear more about this subject.

#### A HOLE IN A SHUTTER THAT REVEALED THE MYSTERY OF THE UNIVERSE

Light is one of the greatest facts in the universe; and it is, therefore, one of the greatest facts of Nature that light, wherever it flies, has a pushing power. Here is a force at work, almost as universal as gravitation, which acts in just the opposite direction, pushing instead of pulling. It is probable that the meaning and consequences of this pressure for the future of the universe are all-important, and we cannot help wondering what the mind of the discoverer of gravitation would have found out if he had known about radiation pressure.

The most famous of all Newton's experiments, like the most famous experiments in all ages, were perfectly simple, and cost scarcely anything to make. All that Newton did was to close his shutters, bore a hole in one that let a ray of light through into the darkened room, and then to take a prism—that is to say, a three-sided piece of glass—and see what happened when the ray of light passed through it. He found that the ray of white sunlight was broken up into many colours. When in place of a hole he made a slit in his shutter, and let the light pass through the prism, he found that the white light was broken up into a band of colours, which were the colours of the rainbow. This band of colours is now called the *spectrum*, and by it many mysteries of the universe have been revealed to scientists.

#### THE RAINDROPS THAT BREAK UP THE LIGHT AND MAKE THE RAINBOW

This experiment proved once and for all what could never have been guessed or believed, that the ordinary white light we know so well is a mixture of colours, and those colours are the colours of the rainbow. The rainbow itself is made out of white light, because the white sunlight is broken up into the colours that make it by being reflected from countless raindrops in the sky. These raindrops

act just as Newton's prism acted, and for the same reason. This great discovery of the compound nature of white light, as it is called, marks the real beginning of this part of science.

Newton, of course, went very carefully into the matter; he understood what happened, and why it happened. He saw that when the light passes through the prism it is bent. We know quite well how rays of light can be bent. As long as nothing bends them they travel in absolutely straight lines, but when they pass from air into water or water into air, or air into glass or glass into air, or in any other case, they are bent; so they come out from the prism at a different angle.

If that was all, the consequence would simply be that the ray of white light, instead of striking the wall just opposite the hole, as it would have done if the prism were not there, would strike it somewhere else, because the prism had turned its course. But just because the white light is not a single thing, but is a mixture of all the colours of the rainbow, something else happens.

#### THE LITTLE BIT OF GLASS THAT SORTS OUT THE COLOURS IN THE SUNBEAM

The rays of light that make these different colours all differ from each other in the extent to which they are bent. The red rays, as Newton found, are the least bent, and the violet rays are the most bent. The consequence is that the light which went into the prism all mixed leaves it all sorted out, the red rays being least bent from the course they would have taken if the prism had not been there, the violet rays being the most bent, and the others taking their places in between.

Not only did Newton discover this, but he laid down the law quite rightly, showing that the colours of light are not the consequence of anything it strikes upon or passes through, but are the natural properties of particular kinds of rays. If a thing is red, that is only because it throws back to our eyes red rays. As he said: "Some rays are disposed to exhibit a red colour and no other; some a yellow and no other; some a green and no other; and so of the rest." He saw, also, that there is an absolute law as to the bending of these rays, the same colour being always bent to the same degree, no matter where the light comes from.

This simple experiment of Newton's has led to such a vast number of consequences that it would take a book to describe the merest outlines of them. In various parts of the world there are great observatories which are devoted to nothing else but repeating Newton's experiment with sunlight.

#### THE GREAT MARVEL OF A LITTLE BAND OF COLOUR

We already know that the band of colour obtained is called a spectrum, and everything seen in this spectrum has to be studied and noted and described and measured; we have to analyse the spectrum as we would analyse a mixture of chemicals in a glass vessel. This subject is known as *spectrum analysis*.

Spectrum analysis has to be applied not only to sunlight, but to the light from the moon and Mars, and the other planets; it has to be applied to the light from the stars and comets and nebulae. We have to study the light given out by hot metals and minerals, and by every kind of lamp, or anything else that gives out light at all. In various ways we can study even the invisible part of the spectrum, the rays beyond the violet and below the red. With those beyond the violet we can take photographs, and we find that those below the red convey heat. We read about the spectrum on pages 2716 to 2719.

In every part of the spectrum we find certain dark lines. Newton missed them, but they are almost more important and interesting than the spectrum itself. Every one of these lines tells us something about the material that the light is coming from. It follows by Newton's experiment that we can tell what kinds of atoms are giving forth light in the sun.

#### HOW A PIECE OF GLASS CAN TELL US WHAT THE STARS ARE MADE OF

An analysis of the spectrum obtained by means of the prism teaches us of what elements the sun and the stars and other heavenly bodies are composed. It proves to us that there are oxygen and water in the air of Mars; it helps us to tell one element from another; to discover in one element the presence of smaller quantities of another element that we can detect by no other means; it even enables us to tell whether stars are moving towards us

or from us in the very line of our sight, and at what rate they are doing so. It was not really until the nineteenth century that the wave theory of light was established; and as we read all about sound in this book, it is worth knowing that it is the resemblance between sound and light which led the great Englishman, Dr. Thomas Young, to ask whether, notwithstanding Newton, light must not also consist of waves, as sound does. Young made the remarkable discovery that, under certain conditions, light added to light will produce darkness, because the waves of the one interfere with the waves of the other, as may happen with sound waves, and as we see when water waves are reflected from a breakwater. It was impossible to have any theory of light except that it is made of waves, once this fact of interference was known.

Now, here we have not only a proof of the wave theory, but also a very interesting explanation of a certain difference between light and sound.

#### WHY A RAY OF LIGHT WILL NOT SPREAD OUT AND FILL A ROOM

If we let in a beam of light through a hole, it certainly spreads out as it travels, but it does not at all behave as sound would. Sound would spread out equally in all directions, just as the light does from a candle standing in the middle of a room. But why does a ray of light remain narrow and not spread out sideways, so that the ray of light does not fill a whole room as sound coming through a hole would?

The answer is that the waves going sideways from a ray of light almost entirely interfere with each other. As we have seen, this interference cannot be explained unless light does indeed consist of waves. This discovery was made by a Frenchman, and Clerk-Maxwell, whose name we have already mentioned, continued the study of light in Great Britain, which has so much to boast of in this connection, and proved for ever that light consists of electric waves passing through the ether.

Now we must study a little the nature of these waves. In the first place, we must remember that, totally unlike the waves of sound, but exactly like the waves of wireless telegraphy, these waves travel in, and are made by, the ether. Ordinary matter, such as air or

water or glass, may be there, too, and may affect the light in one way or another; some kinds of matter, as we know perfectly well, will stop it altogether. But wherever the light is, whether shining through water or travelling in space from star to star, where there is no matter at all, the waves are always in the ether, and in nothing else.

The ether, the "light-bearing ether," as it is sometimes called, is absolutely everywhere, whether matter is there or not, and light travelling through the air to our eyes is in the ether just as much as if the air were not there at all. The ether waves may be bent by matter, as we see when light passes through glass; they may be reflected by matter, as we see in a mirror; they may be absorbed—sucked up, as it were—by matter, as when light shines on a dull, black surface; they may often be delayed in passing through matter; but, nevertheless, the waves are always in the ether.

#### HOW WE SEE THE LIGHT OF THE SUN BY NIGHT

But that is very far from stating the whole of what is to be said about the way in which matter affects these waves; for though they are ether waves, matter starts them, and nothing else starts them. All the light in the world comes from matter that is giving forth light. *Lumen* is one of the Latin words for light, and matter that is giving forth light we call luminous.

The flame of a candle consists of luminous gases; the thread of an electric lamp consists of luminous solid matter; the sun, the stars, and all other things that give light from themselves consist of luminous matter. Yet the things we see are not only the things that are luminous, for we see many things by light which they did not make, but which they reflect. Thus we see the moon, which is not luminous, by light reflected from the luminous sun; and we see this page by light reflected either from the luminous sun or from luminous matter of some other kind.

We must think of all matter as made up of atoms deeply buried or surrounded on all sides by the ether. Now think of a fish under the water moving its tail. If we are watching we may see ripples—that is to say, waves made in the water by the movement of the fish's tail. All

matter everywhere—the sun, or the gases in a candle, or anything else—is as if it were surrounded by a great ocean, which is the ether. And so if the atoms of matter are acting in the same manner as the fish does when it moves its tail, they may set up waves in the ether just as the fish does in the water; and that is exactly what happens whenever and wherever matter is luminous.

#### A MOVING BALL THAT MAKES SOUND AND ITS MOVING ATOMS THAT MAKE LIGHT

We are right to think of the matter in this case as made of atoms. It is the atoms themselves that are the source of the light. A ball of iron might be set trembling, or vibrating, and in this way might cause waves in the air which we should call sound; but no possible movement of the ball as a whole would cause light. If, however, we heat the ball, without moving it at all, something happens to the atoms of it, and they start moving in their own way, setting up ether waves, which we call light. If the ball is only fairly hot, the particular kind of waves will be what we call red light; but if the ball becomes much hotter, it is then what we call white hot, for now its atoms produce that mixture of waves which we call white light.

Nevertheless, if the atoms are giving off light at all, that light, when carefully examined—as Newton examined the ray of sunlight with his prism—will always tell us positively that it was made by iron. If the ball is not pure, and besides the atoms of iron there are atoms of other elements, these atoms will contribute waves special to themselves to the light of the whole; and when the light is analysed we may be able to say there are atoms of magnesium and calcium there as well as atoms of iron.

#### HOW WE CAN SEE THE IRON IN A STAR MILLIONS OF MILES AWAY

We can do this equally well, whether we are studying the light from a hot wire in our room, or whether we are studying light which left a star many hundreds of years ago; and we can say, in a true sense, that we see atoms of iron in that wire that is only a foot away, or in a star so far away that none of us can imagine its distance. Yet there is the evidence that such and such atoms, and no others, are giving forth light in that star; or, rather, were giving forth light



from it hundreds of years ago when the light which has now reached us left the star. The star may long ago have been smashed into dust and disappeared. We cannot say of any star we see in the sky at this moment that it is now there; we can only say of the nearest we know that about four and a half years ago it was certainly there.

**EVERY KIND OF SUBSTANCE GIVES OUT ITS SPECIAL KIND OF LIGHT**

It is a tremendous fact that every kind of atom known to chemists should be so specially different from all other kinds of atoms that it gives off light of a special kind. It is very interesting, also, to study the different kinds of light given out by different atoms when they are made luminous. These different kinds of light are called the *spectra* of the various atoms or elements. Thus there is a spectrum of iron, a spectrum of oxygen, and so on.

We also have to study how these spectra change according to the hotness of the atoms that produce the light; and all this study is specially important, not only because it teaches us the chemistry of so many things, including the stars, but also because it is one of the great tests for an element.

If something that we know nothing about looks like an element, we must always find out whether it has a spectrum of its own different from any other. If it gives off light different from any other light known to us, then it must be made of atoms different from any others that we know—that is to say, it must truly be a new element. But often we find that the thing really gives off a light which tells us that it is only a mixture of two other kinds of elements that we were aware of already.

**THE MARVELLOUS ENERGY ALWAYS GOING ON IN THE AIR TO MAKE LIGHT**

The next great fact we must remember is that it is impossible to get something from nothing. Light is not a "thing" in the sense that it can be handled or chopped up, but it is, nevertheless, a great reality; it is a form of power, or energy, constantly being hurled through the air from the atoms of matter that are luminous. These atoms we must imagine to be vibrating at tremendous rates, and just as this vibration produces the kind of radiations we call heat, so also it produces

the similar kind of radiations we call light. But all the while the atoms are doing this they are spending power; and if anyone spends without replenishing that which is spent, in time he or she will become bankrupt.

Once we grasp the fact that the making of light is spending, we realise how it is that if we are to get the kind of power called light from anything, we must put some kind of power into it. We run electrical power into a wire, and so we get light; we take the chemical power of carbon and oxygen in a candle, and so we get light; we can burn oxygen and hydrogen and produce a great deal of heat which makes a piece of lime very hot, and so we get limelight.

But in no case do we get power unless we give it. Every luminous atom in the universe is cooling down, and in exact proportion as it is giving heat and light it is losing energy, and will in the long run become cold and dark unless it gets new energy from somewhere. This is true even of radium, which makes radiant heat and certain kinds of light also, from inside itself. Its atoms must break down to do this, and must turn into simpler kinds of atoms which contain less energy, or power.

**WHY THE EARTH MUST DIE IF THE SUN'S LIGHT GOES OUT**

The importance of this is not merely that we have to pay for our light every quarter—as light cannot be made for nothing—but that the great luminous bodies in the sky are subject to the same laws as the head of a glowing match, which soon dies out and turns cold. This more especially concerns us as regards our own sun. It is from the sun that we on the earth get heat and light. His rays striking our world mean health and life and gladness for humanity. But the sun is cooling down, and when the sun grows cold all life upon the earth must die, as must all life present or to come upon any of the sun's planets. The making of light is the spending of power; the sun is spending power, and if that power is not replenished, it must therefore be cooling.

The sun, therefore, must one day become cold and dark, as countless other stars in the sky are, and as all the bright ones must become at some time.

The next part of this is on page 5173.



WITH BIG TIN TRUMPET AND LITTLE RED DRUM. MARCHING LIKE SOLDIERS THE CHILDREN COME



Sound, sound the clarion, fill the fife!  
To all the sensual world proclaim



One crowded hour of glorious life  
Is worth an age without a name



# The Child's Book of POETRY

## A HUMOROUS AMERICAN POEM

OLIVER WENDELL HOLMES, our well-beloved poet, was the author of many delightfully amusing poems. Perhaps no example of his verse has proved more popular than this diverting story of the wonderful two-wheeled carriage, or chaise—which was often called a “shay”—built by “the Deacon” in 1755, and driven a hundred years before it came to pieces. The curious part about “the Deacon’s masterpiece,” as this marvellous carriage was called, was that it came into being, so to speak, at the time of an earthquake and held on bravely for a century, only going to pieces when another earthquake occurred! The whole thing is, of course, a characteristic piece of light-hearted humour.

## THE WONDERFUL ONE-HOSS SHAY

HAVE you heard of the wonderful one-hoss shay,

That was built in such a logical way?

It ran a hundred years to a day,  
And then, of a sudden, it— Ah, but stay,

I’ll tell you what happened without  
Scaring the parson into fits,  
Frightening people out of their wits—  
Have you ever heard of that, I say?

Seventeen hundred and fifty-five,  
*Georgius Secundus* was then alive—  
Snuffy old drone from the German hive.  
That was the year when Lisbon town  
Saw the earth open and gulp her down,  
And Braddock’s army was done so brown,  
Left without a scalp to its crown.  
It was on the terrible earthquake day  
That the Deacon finished the one-hoss shay.

Now, in building chaises, I tell you what—  
There is always *somewhere* a weakest spot!  
In hub, tyre, fellow, in spring or thill,  
In panel or crossbar, or floor or sill,  
In screw, bolt, thoroughbrace, lurking still;  
Find it somewhere you must and will—  
Above or below, or within or without—  
And that’s the reason, beyond a doubt,  
That a chaise *breaks down* but doesn’t *wear out*.

But the Deacon swore—as Deacons do,  
With an “I dew vum” or an “I tell yeou”—  
He would build one shay to beat the taown,  
‘N’ the keounty, ‘n’ all the kentry ‘raoun;  
It should be so built that it *couldn’t* break  
daown,

“Fur,” said the Deacon, “it’s mighty plain  
Thut the weakes’ place mus’ stan’ the strain;  
‘N’ the wayt’ fix it, uz I maintain,  
Is only jest  
T’ make that place uz strong uz the rest.”

So the Deacon inquired of the village folk  
Where he could find the strongest oak,  
That couldn’t be split, nor bent, nor broke—  
That was for spokes, and floor, and sills;  
He sent for lancewood to make the thills;  
The crossbars were ash, from the straightest  
trees;

The panels of whitewood, that cuts like cheese  
But lasts like iron for things like these;  
The hubs of logs from the “Settler’s ellum”—

CONTINUED FROM 4926



Last of its timber they  
couldn’t sell ‘em—  
Never an axe had seen  
their chips,

And the wedges flew from between  
their lips,

Their blunt-ends frizzled like celery-tips;  
Step and prop-iron, bolt and screw,  
Spring, tyre, axle, and linchpin, too,  
Steel of the finest, bright and blue;

Thoroughbrace, bison skin, thick and wide;  
Boot, top, dasher, from tough old hide  
Found in the pit when the tanner died.  
That was the way he “put her through.”  
“There!” said the Deacon. “Naow  
she’ll dew!”

Do! I tell you, I rather guess  
She was a wonder, and nothing less!  
Colts grew horses, beards turned grey,  
Deacon and deaconess dropped away,  
Children and grandchildren—where were  
they?

But there stood the stout old one-hoss shay,  
As fresh as on Lisbon earthquake day.

Eighteen hundred—it came and found  
The Deacon’s masterpiece strong and sound.  
Eighteen hundred, increased by ten—  
“Hahnsum kerridge” they called it then.  
Eighteen hundred and twenty came—  
Running as usual, much the same.  
Thirty and forty at last arrive,  
And then came fifty and *fifty-five*.

Little of all we value here  
Wakes on the morn of its hundredth year  
Without both feeling and looking queer.  
In fact, there’s nothing that keeps its youth,  
So far as I know, but a tree and truth.  
This is a moral that runs at large.  
Take it; you’re welcome—no extra charge.  
*First of November*—the earthquake day;  
There are traces of age in the one-hoss shay  
A general flavour of mild decay,  
But nothing local, as one might say.  
There couldn’t be, for the Deacon’s art  
Had made it so like in every part  
That there wasn’t a chance for one to start.  
For the wheels were just as strong as the  
thills,

And the floor was just as strong as the sills,  
And the panels just as strong as the floor,  
And the whipple-tree neither less nor more,

And the back crossbar as strong as the fore,  
And spring and axle and hub *encore* ;  
And yet, as a whole, it is past a doubt,  
In another hour it will be *worn out* !

First of November—"Fifty-five !  
This morning the parson takes a drive.  
Now, small boys, get out of the way !  
Here comes the wonderful one-hoss shay,  
Drawn by a rat-tailed, ewe-necked bay.  
"Huddup !" said the parson. Off went they

The parson was working his Sunday's text,  
Had got to *fiftly*, and stopped perplexed  
At what the—Moses—was coming next.  
All at once the horse stood still,  
Close by the meet'n'-house on the hill.  
First a shiver, and then a thrill,  
Then something decidedly like a spill,  
And the parson was sitting upon a rock,  
At half-past nine by the meet'n'-house clock,  
Just the hour of the earthquake shock !

What do you think the parson found,  
When he got up and stared around ?  
The poor old chaise in a heap or mound,  
As if it had been to the mill and ground !  
You see, of course, if you're not a dunce,  
How it went to pieces all at once—  
All at once, and nothing first,  
Just as bubbles do when they burst.  
End of the wonderful one-hoss shay !  
Logic is logic—that's all I say,

### BEDOUIN SONG

The intensity of the Arab's devotion may be a matter of fact, though we may have some reasonable doubt on the subject. But the flowery manner in which the Arab, in common with all Orientals, expresses his feelings has been well suggested by Bayard Taylor in this very popular song.

FROM the desert I come to thee  
On a stallion shod with fire ;  
And the winds are left behind  
In the speed of my desire.  
Under thy window I stand,  
And the midnight hears my cry :  
I love thee, I love but thee,  
With a love that shall not die  
Till the sun grows cold,  
And the stars are old,  
And the leaves of the Judgment  
Book unfold !

Look from thy window, and see  
My passion and my pain ;  
I lie on the sands below,  
And I faint in thy disdain.  
Let the night-winds touch thy brow  
With the heat of my burning sigh,  
And melt thee to hear the vow  
Of a love that shall not die  
Till the sun grows cold,  
And the stars are old,  
And the leaves of the Judgment  
Book unfold !

My steps are nightly driven,  
By the fever in my breast,  
To hear from thy lattice breathed  
The word that shall give me rest.  
Open the door of thy heart,  
And open thy chamber door,  
And my kisses shall teach thy lips  
The love that shall fade no more  
Till the sun grows cold,  
And the stars are old,  
And the leaves of the Judgment  
Book unfold !

### BREAK! BREAK! BREAK!

Few of the shorter poems of Lord Tennyson are more quoted than these very beautiful lines of his, in which he suggests so perfectly that undertone of melancholy which seems to tune our thoughts when we stand by the seashore on a grey day and listen to the solemn music of the waves.

BREAK, break, break,  
On thy cold, grey stones, O Sea !  
And I would that my tongue could utter  
The thoughts that arise in me.

Oh, well for the fisherman's boy,  
That he shouts with his sister at play !  
Oh, well for the sailor lad,  
That he sings in his boat on the bay !

And the stately ships go on  
To the haven under the hill ;  
But oh, for the touch of a vanished hand,  
And the sound of a voice that is still !

Break, break, break,  
At the foot of thy crags, O Sea !  
But the tender grace of a day that is dead  
Will never come back to me.

### OVER THE HILL

Some charming poems by that writer of true genius, George Macdonald, appear in other parts of our book, and the following by him is very characteristic of his delicate fancy and tender feeling. How beautifully he suggests to the child-mind the wonder of this world and the glory of a world that is to be ! A longer and considerably altered version of this poem has also been published under the title of "Tell Me."

"TRAVELLER, what lies over the hill ?  
Traveller, tell to me :  
I am only a child—from the window-sill  
Over I cannot see."  
"Child, there's a valley over there,  
Pretty and wooded and shy ;  
And a little brook that says, 'Take care,  
Or I'll drown you by-and-by !'"  
"And what comes next ?"—"A little town,  
And a towering hill again ;  
More hills and valleys, up and down,  
And a river now and then."  
"And what comes next ?"—"A lonely moor  
Without a beaten way ;  
And grey clouds sailing slow before  
A wind that will not stay."  
"And then ?"—"Dark rocks and yellow  
sand,  
And a moaning sea beside."  
"And then ?"—"More sea, more sea, more  
land,  
And rivers deep and wide."  
"And then ?"—"Oh, rock and mountain and  
vale,  
Rivers and fields and men,  
Over and over—a weary tale—  
And round to your home again."  
"And is that all ? Have you told the best ?"  
"No ; neither the best nor the end.  
On summer eves, away in the west  
You will see a stair ascend."  
"Built of all colours of lovely stones—  
A stair up into the sky,  
Where no one is weary, and no one moans,  
Or wants to be laid by."  
"I will go." "But the steps are very steep ;  
If you would climb up there,  
You must lie at the foot, as still as sleep,  
A very step of the stair."



### A RED, RED ROSE

The following is one of the most beautiful of the many love-songs by Robert Burns. The style of the song is of an earlier day than his own, and different versions of it have been printed, but it is here given as it first appeared in a Scottish collection of songs to which the poet contributed.

O, my luve's like a red, red rose,  
That's newly sprung in June ;  
O, my luve's like the melody  
That's sweetly played in tune.  
As fair art thou, my bonnie lass,  
So deep in luve am I ;  
And I will luve thee still, my dear,  
Till a' the seas gang dry.  
Till a' the seas gang dry, my dear,  
And the rocks melt wi' the sun ;  
I will luve thee still, my dear,  
While the sands o' life shall run.  
And fare thee weel, my only luve :  
And fare thee weel a while !  
And I will come again, my luve,  
Tho' it were ten thousand mile.

### WHAT I LIVE FOR

George Linneus Banks, who was born in 1821 and died in 1881, was well known in his day as a poet and a writer, though the novels of his wife are now more read than his own writings. He was a man of lofty ideals, and endeavoured by voice and pen to forward the education of his fellow-men, for he was an orator as well as a writer. Of his short poems the following is perhaps the best known, and it sums up the life-work of the true Christian. The last four lines form a favourite quotation with writers and speakers pleading for workers to come forward in any good cause.

I LIVE for those who love me,  
Whose hearts are kind and true ;  
For the heaven that smiles above me,  
And awaits my spirit too ;  
For all human ties that bind me,  
For the task by God assigned me,  
For the bright hopes left behind me,  
And the good that I can do.  
I live to learn their story,  
Who've suffered for my sake ;  
To emulate their glory,  
And follow in their wake ;  
Bards, patriots, martyrs, sages,  
The noble of all ages,  
Whose deeds crown history's pages,  
And time's great volume make.  
I live to hold communion  
With all that is divine ;  
To feel there is a union  
'Twixt Nature's heart and mine ;  
To profit by affliction,  
Reap truths from fields of fiction,  
Grow wiser from conviction,  
And fulfil each grand design.  
I live to hail that season,  
By gifted minds foretold,  
When men shall live by reason,  
And not alone by gold ;  
When man to man united,  
And every wrong thing righted,  
The whole world shall be lighted  
As Eden was of old.  
I live for those who love me,  
For those who know me true ;  
For the heaven that smiles above me,  
And awaits my spirit too ;  
For the cause that lacks assistance,  
For the wrong that needs resistance,  
For the future in the distance,  
And the good that I can do.

\* From "Rhymes of Childhood," copyright, 1890, by special permission of the publishers, The Bobbs-Merrill Co.

### THE PASSIONATE SHEPHERD

Christopher Marlowe was born in 1564, the same year as Shakespeare, and died in 1593. He was one of the dramatists who made the reign of Elizabeth brilliant in English history. One of his best poems is "The Passionate Shepherd"—that is, the shepherd who was so deeply in love that he was willing to do all he could to make his sweetheart happy. The word "madrigals" means songs, and a "kirtle" was a kind of petticoat, usually of gay colour, fine material, and beautiful embroidery, worn above the gown, or dress.

COME, live with me, and be my love,  
And we will all the pleasures prove  
That valleys, groves, and hills and fields,  
Woods or steepy mountains yields.

And we will sit upon the rocks,  
Seeing the shepherds feed their flocks,  
By shallow rivers, to whose falls  
Melodious birds sing madrigals.

And I will make thee beds of roses,  
And a thousand fragrant posies ;  
A cap of flowers, and a kirtle,  
Embroidered all with leaves of myrtle :

A gown made of the finest wool,  
Which from our pretty lambs we pull ;  
Fair lined slippers for the cold,  
With buckles of the purest gold.

A belt of straw and ivy-buds,  
With coral clasps and amber studs ;  
And if these pleasures may thee move,  
Come live with me and be my love.

The silver dishes, for thy meat,  
As precious as the gods do eat,  
Shall, on an ivory table, be  
Prepared each day for thee and me.

The shepherd swains shall dance and sing  
For thy delight each May morning.  
If these delights thy mind may move,  
Then live with me, and be my love.

### THE LAND OF THUS-AND-SO\*

That most charming of living American poets, Mr. James Whitcomb Riley, is the only one whose poems of child-life rival those of the late Eugene Field. Nothing could be happier than the following verses from his pen, in which he describes an ideal land where all is right and nothing wrong, a land that all little folks have often heard about, but to which, like the sensible little folk they are, they have no immediate wish to hasten ! The Land of Every-Day is quite a good enough land for any of us if we only behave ourselves, and though the "Land of Thus-and-So" is all very well to read about, a visit there might bring disappointment.

"How would Willie like to go  
To the land of Thus-and-So ?  
Everything is proper there—  
All the children comb their hair  
Smoother than the fur of cats,  
Or the nap of high silk hats ;  
Every face is clean and white  
As a lily washed in light ;  
Never vaguest soil or speck  
Found on forehead, throat, or neck ;  
Every little crimped ear,  
In and out, as pure and clear,  
As the cherry blossom's blow  
In the land of Thus-and-So.

"Little boys that never fall  
Down the stairs, or cry at all—  
Doing nothing to repent,  
Watchful and obedient ;  
Never hungry, nor in haste—  
Tidy shoe-strings always laced ;

Never button rudely torn  
From its fellows all unworn ;  
Knickerbockers always new—  
Ribbon tie and collar, too ;  
Ribbion watches, worn like men,  
Only always half-past ten—  
Just precisely right, you know,  
For the land of Thus-and-So !

" And the little babies there  
Give no one the slightest care—  
Nurse has not a thing to do  
But be happy and say ' Boo ! '  
While mamma just nods, and knows  
Nothing but to doze and doze ;  
Never litter round the grate ;  
Never lunch or dinner late ;  
Never any household din,  
Peals without or rings within—  
Baby coos nor laughing calls,  
On the stairs or through the halls—  
Just great Hushes to and fro  
Pace the land of Thus-and-So !  
" Oh, the land of Thus-and-So !  
Isn't it delightful, though ? "  
" Yes," lisped Willie, answering me  
Somewhat slow and doubtfully—  
" Must be awful nice, but I  
Rather wait till by-and-by  
'Fore I go there—may be when  
I be dead I'll go there then—  
But—" the troubled little face  
Closer pressed in my embrace—  
" Let's don't never ever go  
To the land of Thus-and-So ! "

#### \* CORONATION

This poem by Helen H. Jackson is a good example of the poetic apologue, or " story with a moral." The purpose of the poet is to illustrate the ancient truth that an earthly crown may only be the symbol of a slave, while true freedom, both of mind and person, may be clothed with the poorest raiment.

At the king's gate the subtle noon  
Wove filmy yellow nets of sun ;  
Into the drowsy snare too soon  
The guards fell one by one.  
Through the king's gate, unquestioned then,  
A beggar went, and laughed, " This brings  
Me chance, at last, to see if men  
Fare better, being kings."  
The king sat bowed beneath his crown,  
Propping his face with listless hand ;  
Watching the hour-glass sifting down  
Too slow its shining sand.  
" Poor man, what wouldst thou have of me ? "  
The beggar turned, and, pitying,  
Replied, like one in dream, " Of thee,  
Nothing. I want the king."  
Up rose the king, and from his head  
Shook off the crown and threw it by.  
" O man, thou must have known," he said,  
" A greater king than I."  
Through all the gates, unquestioned then,  
Went king and beggar hand in hand,  
Whispered the king, " Shall I know when  
Before his throne I stand ? "  
The beggar laughed. Free winds in haste  
Were wiping from the king's hot brow  
The crimson lines the crown had traced.  
" This is his presence now."  
At the king's gate the crafty noon  
Unwove its yellow nets of sun ;  
Out of their sleep in terror soon  
The guards waked one by one.

" Ho, here ! Ho, here ! Has no man seen  
The king ? " The cry ran to and fro ;  
Beggar and king, they laughed, I ween,  
The laugh that free men know.

On the king's gate the moss grew grey ;  
The king came not. They called him dead ;  
And made his eldest son one day  
Slave in his father's stead.

#### OLD CHRISTMAS

Mrs. Mary Howitt has captured in these jolly verses something of the spirit of old-fashioned Christmas—the time of good cheer, good-fellowship, and general kindness. " Old Christmas," we see, is not too old to take a vigorous part in merry-making ; he is just as old or as young as we wish him to be, and, if our hearts are light and warm with kindness, we shall find him as young and as genial as any of us.

Now, he who knows old Christmas,  
He knows a carle of worth ;  
For he is as good a fellow  
As any upon the earth.

He comes warm-cloaked and coated,  
And buttoned up to the chin ;  
And soon as he comes a-nigh the door  
We open and let him in.

We know he will not fail us,  
So we sweep the hearth up clean ;  
We set for him the old armchair,  
And a cushion whereon to lean.

And with sprigs of holly and ivy  
We make the house look gay,  
Just out of old regard to him,  
For 'twas his ancient way.

He comes with a cordial voice  
That does one good to hear,  
He shakes one heartily by the hand,  
As he hath done many a year.

And after the little children  
He asks in a cheerful tone,  
Jack, Kate, and little Annie ;  
He remembers them every one !

What a fine old fellow he is !  
With his faculties all as clear,  
And his heart as warm and light,  
As a man in his fortieth year !

What a fine old fellow, in troth !  
Not one of your griping elves,  
Who, with plenty of money to spare,  
Think only about themselves.

Not he ! for he loveth the children,  
And holiday begs for all ;  
And comes with his pockets full of gifts  
For the great ones and the small.

And he tells us witty old stories,  
And singeth with might and main ;  
And we talk of the old man's visit  
Till the day that he comes again.

And all the workhouse children  
He sets them in a row,  
And giveth them rare plum-pudding,  
And twopence apiece also.

He must be a rich old fellow—  
What money he gives away !  
There's not a lord in England  
Could equal him any day !

Good luck unto old Christmas,  
And long life, let us sing,  
For he doth more good unto the poor  
Than many a crownèd king !

## THE BIRD THAT SANG "FIDDLE-DEE-DEE!"



The gun it went off with a terrible bang, but the bird in the tree continued to whistle his "Fiddle-dee-dee!"



AN INCIDENT IN A RAILROAD CAR

The friendships of poets, and poets' praise of other poets, have produced many charming and tender verses that are among the treasures of our poetry. For there is nothing so humanly attractive as the honest admiration of one man of genius for another. One of the best things which Bret Harte wrote was his famous poem "Dickens in Camp," in which he praises the magic power of the great story-teller. But all great poets and authors, from Homer to Robert Louis Stevenson, have inspired other poets to sing of them. To Shakespeare and Burns how many poems have been inscribed! This poem by James Russell Lowell, our famous American poet, is one of the finest tributes ever paid to the genius of Scotland's greatest poet, Robert Burns.

**H**He spoke of Burns: men rude and rough  
Pressed round to hear the praise of one  
Whose breast was made of manly, simple stuff,  
As homespun as their own.

And, when he read, they forward leaned,  
And heard, with eager hearts and ears,  
His birdlike songs whom glory never weaned  
From humble smiles and tears.

Slowly there grew a tender awe,  
Sunlike o'er faces brown and hard,  
As if in him who read they felt and saw  
Some presence of the bard.

It was a sight for sin and wrong  
And slavish tyranny to see,  
A sight to make our faith more pure and strong  
In high Humanity.

I thought, these men will carry hence  
Promptings their former life above,  
And something of a finer reverence  
For beauty, truth, and love.

God scatters love on every side,  
Freely among his children all;  
And always hearts are lying open wide,  
Wherein some grains may fall.

There is no wind but soweth seeds  
Of a more true and open life,  
Which burst, unlooked for, into high-souled deeds  
With wayside beauty rife.

We find within these souls of ours  
Some wild germs of a higher birth,  
Which in the poet's tropic heart bears flowers  
Whose fragrance fills the earth.

Within the hearts of all men lie  
These promises of wider bliss,  
Which blossom into hopes that cannot die,  
In sunny hours like this.

All that hath been majestic  
In life or death, since time began,  
Is native in the simple heart of all,  
The angel heart of man.

And thus, among the untaught poor  
Great deeds and feelings find a home,  
Which casts in shadow all the golden lore  
Of classic Greece or Rome.

O mighty brother-soul of man,  
Where'er thou art, in low or high,  
Thy skyey arches with exulting span  
O'er-roof infinity!

All thoughts that mould the age begin  
Deep down within the primitive soul,  
And from the many slowly upward wing  
To one who grasps the whole:

In his broad breast, the feeling deep  
That struggled on the many's tongue  
Swell to a tide of thought whose surges leap  
O'er the weak thrones of wrong.

Never did poesy appear  
So full of Heav'n to me as when  
I saw how it would pierce through pride and  
To lives of coarsest men. [fear,

It may be glorious to write  
Thoughts that shall glad the two or three  
High souls like those far stars that come in  
sight

Once in a century.

But better far it is to speak  
One simple word which now and then  
Shall waken their free nature in the weak  
And friendless sons of men;

To write some earnest verse or line  
Which, seeking not the praise of art,  
Shall make a clearer faith and manhood shine  
In the untutored heart.

"FIDDLE-DEE-DEE!" \*

The unailing charm of Eugene Field's poems about little folk has been one of the features of our book of poetry. If we were to ask for a show of hands from all the boys and girls who have delighted in his quaint humour and tuneful rhymes, it would be a case of "all hands up." In these verses he is laughing, in his sly way, at the "little soldier of four," and we are happy to think that the bird on the tree is also laughing at the valiant marksman!

**T**HERE once was a bird that lived up in a tree,  
And all he could whistle was "Fiddle-dee-dee!"—

A very provoking, unmusical song  
For one to be whistling the summer day long!  
Yet always contented and busy was he  
With that vocal recurrence of "Fiddle-dee-dee!"

Hard by lived a brave little soldier of four.  
That weird iteration annoyed him so sore;  
"I prithee, Dear-Mother-Mine! fetch me my gun,

For, by our St. Diddy! the deed must be done  
That shall presently rid all creation and me  
Of that ominous bird and his 'Fiddle-dee-dee'!"

Then out came Dear-Mother-Mine, bringing  
her son

His awfully truculent little red gun;  
The stock was of pine and the barrel of tin,  
The "Bang" it came out where the bullet  
went in—

The right kind of weapon, I think you'll agree,  
For slaying all fowl that go "Fiddle-dee-dee!"

The brave little soldier quoth never a word,  
But he up and he drew a straight bead on  
that bird;

And while that vain creature provokingly sang,  
The gun it went off with a terrible bang!

Then loud laughed the youth, "By my  
Bottle!" cried he,

"I've put a quietus on 'Fiddle-dee-dee'!"

Out came then Dear-Mother-Mine, saying:  
"My son,

Right well have you wrought with your little  
red gun!

Hereafter no evil at all need I fear,  
With such a brave soldier as You-My-Love  
here!"

She kissed the dear boy. The bird in the tree  
Continued to whistle his "Fiddle-dee-dee!"



READING CLUB

## OUR CHRISTIAN NAMES

**W**E know that there are two classes of names, Christian names and surnames, the Christian name being so called because it is the name given when a person is christened, and the surname a name given "over and above" the Christian name, from the French *sur*, over.

We read on page 475 how people got their surnames, and what those surnames meant. Now we want to know the meaning of Christian names. These are older than surnames, for, as we know, in early days a person was called simply John or Mary, and it was not till later that it became necessary to add a surname. Just as sur-

**ADA**: rich gift; another form of Edith—Anglo-Saxon.

**ADAM**: man—Hebrew.

**AGATHA**: kind—Greek.

**AGNES**: pure—Greek.

**ALBERT**: bright—Teutonic. The Bert is seen also in Bertha.

**ALEXANDER**: a helper of men—Greek.

**ALFRED**: a good counsellor—Teutonic.

**ALICE**: noble—Teutonic.

**AMY**: beloved—French; *aimée* means beloved.

**ANDREW**: manly—Greek.

**ANN**: grace—Hebrew.

This is the same name as **HANNAH** and **NANCY**.

**ARNOLD**: strong as an eagle—Teutonic.

**ARTHUR**: noble—Celtic.

CONTINUED FROM 4913

**BARBARA**: a foreigner, or stranger—Greek.

**BASIL**: kingly—Greek.

**BEATRICE**: making glad, or happy—Latin.

**BENJAMIN**: son of the right hand, that is, of good fortune—Hebrew.

**BERNARD**: bold as a bear, daring—Teutonic.

**BERTHA**: bright—Teutonic.

**BLANCHE**: white—French.

**BRIAN**: strong—Celtic.

**CAROLINE**: strong; this is the feminine of Carolus, the Latin for Charles.

**CHARLOTTE** has the same meaning.

**CATHERINE**: pure—Greek.

**CECIL**: blind—Latin.

**CHARLES**: strong, courageous, manly—Teutonic.

names, when originally given, had a real meaning suitable to the person to whom they

were given, so it was with Christian names. A brave man was called Andrew, which means "manly," and a fair girl was called Blanche, which means "white." Nowadays, we do not think much about the meaning of names when we give them, so we may find a coward called Andrew, and a dark girl called Blanche.

It would be too long to give all the Christian names and their meanings, but here is a list of the most common ones, together with the languages from which they have come down to us:

**CHRISTOPHER**: carrying Christ. The giant who carried a little child across the river and then found the child was "the little Lord Jesus" was called by this name, the bearer of Christ.

**CLARA**: bright—Latin.

**CLARICE** and **CLARISSA** have the same meaning.

**CLAUD**: lame—Latin.

**CLEMENT**: merciful, showing clemency—Latin.

**CYRIL**: lordly—from the Greek word for lord.

**DANIEL**: God is the judge—Hebrew.

**DAVID**: beloved—Hebrew.

**DOROTHY**, **DORA**, **DOLLY**: the gift of God—Greek.

**EDGAR**: rich or valuable spear—Anglo-Saxon.



- EDITH : rich gift—Anglo-Saxon. ADA has the same meaning.
- EDNA : pleasure—Hebrew
- EDWARD : valuable or rich guard—Anglo-Saxon.
- EDWIN : rich or valuable friend—Anglo-Saxon.
- ELEANOR : light—Greek.
- HELEN and NORA and LENA all have the same meaning.
- ELIZABETH : God of the oath—Hebrew. ISABEL has the same meaning.
- EMILY : industrious—Teutonic. EMMA is another form of the same name.
- ERIC : rich, powerful, strong—Anglo-Saxon.
- ERNEST : eagle - stone—Teutonic.
- ESTHER : a star, the planet Venus—Persian.
- ETHEL : noble—Anglo-Saxon.
- EUSTACE : healthy, firm, strong—Greek.
- EVA : life—Hebrew. EVE, EVELINE are the same.
- FLORENCE : blooming, flourishing—Latin.
- FRANCIS : free—French.
- FRANK, FRANCES, FANNY are all forms of the same name.
- FREDERICK : a peaceful ruler—Teutonic.
- GEORGE : a farmer, husbandman—Greek.
- GERALD, GERARD : spear-power—Teutonic.
- GERTRUDE : spear-girl or maiden—Teutonic.
- GILBERT : little bright or famous one—Teutonic.
- GODFREY, GEOFFREY : God's peace—Teutonic.
- GRIFFITH : ruddy—Welsh.
- HAROLD : warrior, power, strength—Anglo-Saxon.
- HENRY, HARRIET : home ruler—Teutonic. HENRIETTA has the same meaning.
- HERBERT : glory of the army—Anglo-Saxon.
- HILDA : battle or war maiden—Teutonic.
- HUGH : mind, soul—Teutonic. HUGO is another form of this name.
- IDA : happy—Teutonic.
- ISAAC : laughter—Hebrew.
- JAMES : the same as JACOB, a supplanter—Hebrew.
- JOHN : the Lord graciously gave—Hebrew. JANE, JANET, JEAN, JOAN, JESSIE, IAN, IVAN all mean the same.
- JOSEPH : may he add children—Hebrew.
- KENNETH : handsome, beautiful—Celtic.
- LAURA : a laurel—Latin.
- LAURENCE : crowned with laurel—Latin.
- LEONARD : strong as a lion—Teutonic.
- LIONEL : lion—Latin.
- LOUISE : the feminine of Louis or Lewis, famous warrior—French.
- LUCY : light, born at day-break—Latin.
- LUKE : light—Latin.
- MABEL : short for Amabel, lovable—Latin.
- MARGARET and MARGORIE : a pearl—Greek.
- MADGE, PEGGY, are forms of the same name.
- MARTHA : lady—Hebrew.
- MARTIN : warlike—Latin.
- MARY : bitter—Hebrew.
- MARIA, MAY, MOLLY, POLLY, MARION, MIRIAM all have the same meaning.
- MATILDA : mighty battle maid—Teutonic.
- MAUD, MAGDALENE, MADELINE are forms of this name.
- MAURICE : Moorish, dark coloured—Latin.
- NICHOLAS : victory of the people—Greek.
- NOAH : rest—Hebrew.
- NOEL : born on Christmas Day—French.
- NORMAN : Northman, a man from the North—Teutonic.
- OLIVER : olive—Latin.
- PATRICK : noble—Latin.
- PAUL : little—Greek.
- PETER : rock, stone—Greek
- PHILIP : one who is fond of horses—Greek.
- PHYLLIS : a green leaf, or greenleaf bough—Greek.
- RACHEL : an ewe—Hebrew.
- RALPH, RUDOLPH : wolf of fame—Teutonic.
- REBECCA : ensnarer, or a noose—Hebrew.
- REGINALD : powerful judgment—Teutonic.
- RICHARD : stern ruler or king—Teutonic.
- ROBERT, RUPERT : bright in fame—Teutonic.
- RUTH : friend—Hebrew.
- SAMUEL : one heard of God—Hebrew.
- SARAH : princess—Hebrew.
- SELINA : the moon—Greek.
- SIBYL : a prophetess, or sorceress—Greek.
- SILAS : short for Silvanus, living in a wood—Latin.
- SYLVIA means the same.
- SILVESTER : living in a wood—Latin.
- SOPHIA : wisdom—Greek.
- STEPHEN, STEPHANUS : a crown—Greek.
- SUSAN : a lily—Hebrew.
- THEOBALD : prince of the people—Teutonic.
- THEODORE : another form of Dorothy; the gift of God.—Greek.
- THEOPHILUS : lover of God—Greek.
- THOMAS : a twin—Hebrew.
- TIMOTHY : honoured of God—Greek.
- URSULA : she-bear—Latin.
- VALENTINE : healthy, well—Latin.
- VICTORIA, VICTOR : victory; conquest—Latin.
- VIVIAN : lively—Latin.
- WALTER : powerful warrior—Teutonic.
- WILHELMINA : the feminine of Wilhelm, the German for William.
- MINA and MINNIE are forms of this name.
- WILLIAM : helmet of resolution—Teutonic.
- WINIFRED : the same as Genevieve : white stream—Celtic.

# FACTORS AND PRIME NUMBERS

At various times in the course of our work we have had occasion to use factors. By way of definition we learned that when numbers are multiplied together the result is called the *product*, and the numbers which are multiplied are called *factors* of the product. Thus, if we multiply 3 by 7, the product is 21, and 3 and 7 are factors of 21. We may, of course, multiply more than two numbers together; so it follows that a number may have more than two factors. For example, the number 48 is obtained by multiplying 2, 4, and 6; or by multiplying 3, 4, and 4; or by multiplying 2, 2, 2, 2, and 3.

But there are many numbers which cannot be obtained by multiplying other numbers together—that is, there are many numbers which cannot be separated into factors. The number 23 cannot be obtained by multiplying two other numbers. It is got by multiplying the *same* number, 23, and 1, but not from any other pair of numbers. Such numbers—numbers which have no factors except themselves and 1—are called *prime numbers*.

In the case of small numbers we can tell whether they are prime or not by thinking of our multiplication tables. If we cannot find a pair of factors, other than the number itself and 1, which give us the required number, it is prime.

In this way we find the following prime numbers—namely, 2, 3, 5, 7, 11, 13, 17, 19, 23, 31, 37, 41, and so on. Our multiplication table takes us as far as 144, and the prime numbers up to this figure are probably as great as we have any need for.

When we have separated a number into factors, each of which is a prime number, the number is said to be resolved into prime factors.

Resolve 2184 into prime factors.

We begin with the smallest prime number, 2, and try whether 2184 will divide by 2, leaving no remainder. We find that it will, giving us 1092.  

$$\begin{array}{r} 2)2184 \\ \underline{4} \\ 1092 \\ 2)1092 \\ \underline{2} \\ 546 \\ 2)546 \\ \underline{2} \\ 273 \\ 3)273 \\ \underline{3} \\ 91 \\ 7)91 \\ \underline{7} \\ 13 \end{array}$$

We find that this result, 273, will not divide by 2; so we proceed to the

next prime number, 3, and try that. It does divide exactly, giving 91. Try 3 again. It will not divide 91 without a remainder, so we take the next prime number, 5. We find that 5 will not divide 91, and proceed to the next prime number, 7. This divides 91, and gives 13 for the result. But 13 is itself a prime number, so we have now come to the end of our work. Thus, the prime factors of 2184 are 2, 2, 2, 3, 7, 13. The result is usually written thus:

$$2184 = 2 \times 2 \times 2 \times 3 \times 7 \times 13,$$

or, to save space, since the number 2 occurs three times, we may, if we like, write the 2 *once* only, and put a small 3 after it, above the line, thus:  $2^3$ . Our result would then appear like this:

$$2184 = 2^3 \times 3 \times 7 \times 13.$$

The small 3 is called an *index*, because it points out how many 2's are to be multiplied together.

It is evident that if we are finding the factors of a big number it will save us much time and work if we are able to tell at a glance, without doing the entire division, whether our given number is divisible by such prime numbers as 2, 3, 5. In the case of the numbers 2, 3, 5, and 11 we can do so.

(1) A number is divisible by 2 if its units figure is divisible by 2. Such a number is called an *even* number.

(2) A number is divisible by 3 if the result obtained by adding together its separate figures is divisible by 3. Thus, the number 2184 is divisible by 3, because when 2, 1, 8, and 4 are added together, the result, 15, is divisible by 3.

(3) A number is divisible by 5 if its units figure is a 0 or a 5.

(4) To test whether a number is divisible by 11, first add together its first, third, fifth figures, and so on; then add together its second, fourth, sixth figures, and so on. Subtract the one result from the other. Then, if this last result is 0, or if it divides by 11, the given number will divide by 11.

Thus, if the given number is 3143635, add together the first, third, fifth, and seventh figures—that is, 3, 4, 6, 5. The result is 18. Add together the second, fourth, and sixth figures—1, 3, 3. The result is 7. Take 7 from 18. The result, 11, is divisible by 11. Therefore we know that 3143635 is divisible by 11.

Now let us resolve 143220 into prime factors, remembering these facts.

$$\begin{array}{r} 2)143220 \\ 2)71610 \\ 3)35805 \\ 5)11935 \\ 7)2387 \\ 11)341 \\ 31 \end{array}$$

$$143220 = 2^2 \times 3 \times 5 \times 7 \times 11 \times 31.$$

The number is divisible by 2, since its units figure, 0, divides by 2.

The result, 71610, divides by 2 for the same reason.

The result, 35805, will *not* divide by 2, since the units figure, 5, will not.

Next, since 3, 5, 8, 5 make 21, and 21 divides by 3, therefore the number 35805 also divides by 3.

Testing the result, 11935, in the same way, we see that 11935 will *not* divide by 3. But it divides by 5, since its units figure is a 5. The result, 2387, will not divide by 5, since its units figure is neither 0 nor 5. By actual division we find 2387 divides by 7. The result, 341, is now small enough for us to see that it divides by 11, without applying the rule given above.

ANSWERS TO EXAMPLES ON PAGE 2979.

- (1) £7 10s. 6d. (2) \$249.40. (3) £7 14s. 4d.  
(4) \$278.20. (5) 1400 times.  
(6) \$174 yards. (7) £56 13s. 6½d.  
(8) £2 9s. 6d.; 17 weeks.

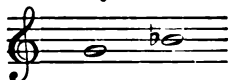
## MUSIC

### SOME NEW FAIRY LADDERS

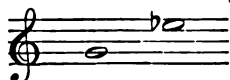
If C major has a first cousin, or a tonic minor, it follows that the major scales of G, D, A, and E must have a relation too, for everything is quite fair in our fairyland of music. We first have the tonic minor of G major:



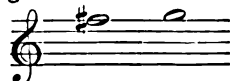
Here we see all our rules carried out quite properly; we have the minor third from the keynote:



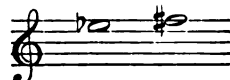
also a minor sixth from the keynote:



Then Fairy F has her holiday, and we have little Goblin F# to sing instead, so that we may have the necessary semitone between the seventh and eighth degrees:

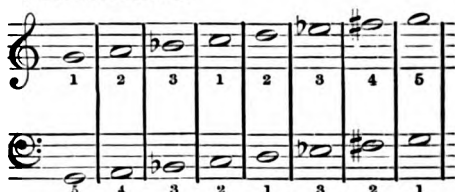


and this gives us the augmented second between the sixth and seventh:



The fingering is exactly the same, which means the fourth finger on the

seventh note in the right hand, and the fourth finger on the second note in the left hand.



Now we want a key-signature, because the little goblins like their flags hung in the proper place. The fairies have told us that the tonic minor has three flats more, or three sharps less, than its tonic major, so there must be a difference of three signs between G major and G minor. As a matter of fact, G major has no flats, and this is how the fairy rule works. The B in G major becomes B $\flat$  in G minor, and the E in G major becomes E $\flat$  in G minor, so there are two of our flats. But what about the third one? The signature of G major is F#. We cannot have sharps and flats together in one key-signature, it would be considered quite wrong in the courts of fairyland. So little Goblin F# says, "No, I cannot have my flag there," and he walks away to do something else.

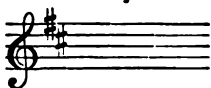
As Goblin F# is away, everyone expects to hear Fairy F; and as her voice is one semitone lower—that is, *flatter*—than F#, the song has been *flattened*—that is, made flat—and in

fairyland they say that as three notes have been thus made flat, the absence of  $F \sharp$  in the signature and the appearance of two flats make the difference of three signs. Instead of  $F \sharp$ , it is  $B \flat + E \flat + F \natural$ , and  $F \natural$  is  $F \sharp$  flattened, so here is the proper signature of G minor, both in the treble and bass clefs:



We said little Goblin  $F \sharp$  had gone away to do other work; he knew, when it came to the point, that poor little Fairy F would be in great distress, because she would be too far away from Fairy G; so at the last minute he seems to turn up quite accidentally, just as little Fairy F is wondering whatever she is going to do, and hangs up his little flag where we see it in our picture. We can almost hear him saying, "Never mind, little Fairy F, I will help, and you can run away and have your games in the fairy glen, as you so wanted to do."

We will have a picture of one more fairy ladder to-day—the scale of D minor, the tonic minor of D major. We know that there are two sharps in the signature of D major:

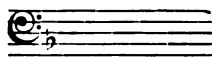


so, as our rule tells us we must have three sharps less in the tonic minor, we must again put on our considering-caps to solve this fairy riddle. First of all, here is a picture of the scale *without* its key-signature:

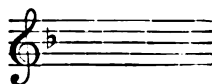


The third degree from the keynote must be a minor third, so  $F \sharp$  has his holiday, and Fairy F, who sings a semitone *flatter*, takes his place. This accounts for the vanishing of  $F \sharp$  from the signature, and to have lowered a note one semitone is to have flattened it. The sixth degree must be a minor sixth from the keynote, so B in the

scale of D major is supplanted by  $B \flat$  in the tonic minor; therefore little  $B \flat$  hangs up his flag in its proper place, at the beginning of the stave:



As he is thus in possession, no little sharp can hang up his banner, for, as we were told, it would not be correct to do so. Therefore little  $C \sharp$  disappears from the signature; but as he is wanted to give the necessary semitone between the seventh and eighth degrees, he also seems to walk in quite accidentally at the right moment, just as little  $F \sharp$  did in the scale of G minor. So the signature of D minor is just one flat:



There is a little story much loved by the fairies, with which we may finish this lesson. One of the greatest friends they have ever had was named Mozart. It seemed as if he had come straight away from the Land of Beautiful Tone, for almost as soon as he could walk he would toddle towards the instrument called the clavier, and pick out the notes that, played together, sounded pretty. When he was four years old his father began to help him, and very soon he could play easy little pieces quite well; and, more wonderful still, he began to compose. He was too small to write down what he wanted to say, so his father wrote it down for him.

When he was only six years old, the wee boy sat down to write a *concerto*, which is a composition for one special instrument, which in this case was the clavier, accompanied by an orchestra. From these early days he was true to the fairy voices, and wrote such things as they whispered to him. His father was so pleased that he did all he could to help his little son; and the story of his musical life is so wonderful, all he did was so good, and therefore so beautiful, that, though he died in the year 1791, he still lives with us, for his music is loved more and more by all true musicians. The more we know, the more we shall appreciate the wonderful genius of Mozart, the friend of the fairies.

## LES ENFANTS DANS LA FORÊT

The English version of this story is given on page 1523.

Il y avait une fois deux enfants qui habitaient une grande maison à la lisière d'un bois. Leurs parents, qui les aimaient tendrement, étaient assez riches pour leur acheter toutes les belles choses qu'ils désiraient, et toute la journée, ils jouaient dans un superbe jardin, y apprenant les chants des oiseaux et les secrets des fleurs. Mais un triste jour, leurs parents les quittèrent pour un séjour meilleur, dans le ciel, et le frère et la sœur restèrent seuls.

Le garçon fit de son mieux pour consoler sa petite sœur, mais les jours étaient tristes et bien qu'alors il ne s'en rendissent pas compte, des jours plus sombres devaient bientôt venir.

Les enfants avaient un oncle qu'ils n'avaient jamais vu. Il habitait au loin, par delà les mers; mais dès qu'il apprit la mort de son frère, le père des enfants, il se hâta d'aller chez eux. Il savait que maintenant que leur père était mort, les enfants auraient tout son argent, et l'oncle savait aussi que s'il pouvait se débarrasser d'eux, tout l'argent serait à lui.

Et plus il songeait à cet argent, plus il le désirait. Et alors, une pensée affreuse lui passa par la tête. Il résolut de tuer les deux petits innocents et de prendre leur argent.

Il engagea donc deux voleurs et les paya pour entraîner les enfants dans un endroit écarté du bois et les y tuer.

Un matin, tandis que le soleil brillait et que tous les oiseaux étaient gais, les voleurs se glissèrent dans le jardin où les enfants jouaient, et les ravirent. Ils étaient grands et rudes, et les enfants eurent peur; mais les voleurs leur dirent qu'ils avaient été envoyés par leur oncle et ils n'osèrent pas désobéir. Les hommes les entraînèrent hors du jardin dans la forêt, et marchèrent jusqu'à ce qu'ils atteignissent un lieu écarté.

La route avait été longue et les enfants furent heureux de se reposer. Ils s'assirent sur un tronc d'arbre pendant que les voleurs s'éloignaient et causaient à voix basse.

Mais bientôt, ils se mirent à se disputer; leurs voix étaient fortes et

pleines de colère, et les enfants entendirent des paroles qui les firent trembler de peur.

"J'ai été payé pour les tuer, et je veux gagner mon argent," l'un d'eux répétait sans cesse.

Mais l'autre voleur semblait plus bienveillant.

"Pourquoi les tuer?" dit-il. "Pardons-les, et peut-être que quelqu'un les trouvera et leur donnera abri."

La petite fille se serra contre son frère. "Ils veulent nous tuer," dit-elle, dans un murmure terrifié.

Mais avant que le garçon pût répondre, le voleur bienveillant s'avança et leur parla.

"Restez ici pendant que nous allons chercher de la nourriture et un abri pour la nuit," dit-il d'une voix rauque.

Ils s'éloignèrent ensuite et les enfants restèrent seuls dans le bois. Ils n'osaient pas retourner chez leur méchant oncle et ils n'avaient pas d'autre demeure; ils allèrent donc à l'aventure, la main dans la main, dans l'espoir de trouver un refuge.

La forêt était très belle, et d'abord, ils furent heureux parmi les fleurs sauvages et les fougères; mais bientôt le soleil se coucha, les oiseaux cessèrent de chanter et un grand silence enveloppa tout. Les enfants, toutefois, continuèrent bravement d'avancer, fatigués, affamés, et tristes.

Bientôt, les arbres furent si serrés les uns contre les autres qu'ils purent à peine trouver un passage, et finalement, les ténèbres de la nuit descendirent et cachèrent même les arbres à leur vue. Trop épuisés et effrayés pour aller plus loin, les enfants s'assirent sous un chêne et s'endormirent dans les bras l'un de l'autre.

Les oiseaux de la forêt les regardèrent du haut de leurs nids; les timides écureuils aux longues queues, les contemplèrent avec surprise et la brise secoua les feuilles et les fit tomber, les couvrant ainsi d'un manteau de pourpre et d'or.

Et quand le jour luit, un bel ange descendit et les emporta vers leur père et leur mère, dans le ciel superbe.

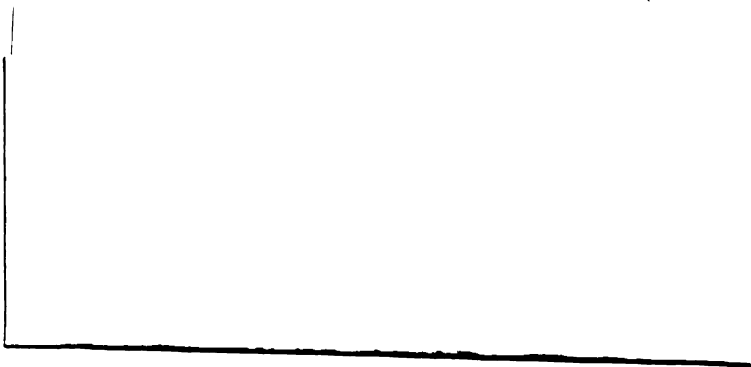
THE NEXT SCHOOL LESSONS ARE ON PAGE 5115







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